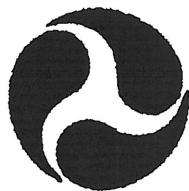


135-TRC-09-008

SAFETY COMPLIANCE TESTING FOR FMVSS 135
Passenger Car Brake Systems

Toyota Motor Manufacturing, Kentucky, Inc.
2009 Toyota Venza, 5-Door Liftback, MPV
NHTSA No. C95108

TRANSPORTATION RESEARCH CENTER INC.
10820 State Route 347
East Liberty, Ohio 43319



Final Report Completed: May 13, 2009

FINAL REPORT

Prepared Under Contract No.: DTNH22-06-C-00033

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
1200 New Jersey Avenue S.E.
West Building 4th Floor
OVSC (NVS-221)
Washington, DC 20590

Prepared for the Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-06-C-00033.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products of manufacturers.

Prepared By Reidy Lander

Approved By Jeff Stuby

Approval Date: 5/14/09

Final Report Acceptance By OVSC:

HT/ma
Contract Technical Manager, Office of
Vehicle Safety Compliance

5/19/09
Acceptance Date

| | | | |
|---|---|--|------------|
| 1. REPORT NUMBER: 135-TRC-09-008 | 2. GOVERNMENT ACCESSION NO.: | 3. RECIPIENTS CATALOG NO.: | |
| 4. TITLE AND SUBTITLE: Final report of FMVSS 135 Compliance Testing of a 2009 Toyota Venza, 5-Door Liftback MPV, NHTSA No. C95108 | | 5. REPORT DATE: May 13, 2009 | |
| | | 6. PERFORMING ORGANIZATION CODE: TRC 20060110/9360 | |
| 7. AUTHOR(S): Project Manager: ALAN IDA Project Engineer: RANDALL A. LANDES | | 8. PERFORMING ORGANIZATION REPORT NO.: TRC-DOT-135-092 | |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS: Transportation Research Center Inc. 10820 State Route 347 East Liberty, Ohio 43319 | | 10. WORK UNIT NUMBER: | |
| | | 11. CONTRACT OR GRANT NO.: DTNH22-06-C-00033 | |
| 12. SPONSORING AGENCY NAME AND ADDRESS: U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-221) 1200 New Jersey Avenue S.E. West Wing 4 th Floor Washington, DC 20590 | | 13. TYPE OF REPORT AND PERIOD COVERED: Final test report Tested: 04/03/09 to 05/12/09 | |
| | | 14. SPONSORING AGENCY CODE: NVS-221 | |
| 15. SUPPLEMENTARY NOTES: | | | |
| 16. ABSTRACT: Compliance tests were conducted on the subject 2009 Toyota Venza, 5-Door Liftback MPV, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-135-01 for the determination of FMVSS 135 compliance. Test failures identified were as follows: None. | | | |
| 17. KEY WORDS: Compliance Testing Safety Engineering FMVSS 135 | | 18. DISTRIBUTION STATEMENT: Copies of this report are available from: NHTSA Technical Information Services NPO-411 1200 New Jersey Ave, S.E. Washington, DC 20590 Email: tis@nhtsa.dot.gov FAX: 202-493-2833 | |
| 19. SECURITY CLASSIF. (OF THIS REPORT): Unclassified | 20. SECURITY CLASSIF. (OF THIS PAGE): Unclassified | 21. NO. OF PAGES: 69 | 22. PRICE: |

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------|---|-------------|
| | Notice | i |
| | Table of Contents | iii |
| 1.0 | Introduction | 1 |
| 2.0 | Vehicle Information Sheet - Data Sheet 1 | 2 |
| 3.0 | Summary of Testing | 4 |
| 4.0 | Vehicle Data | 5 |
| 5.0 | Test Data | 7 |
| 6.0 | Photographs | 33 |
| 7.0 | Instrumentation and Daily Calibrations | 51 |
| Appendix A | Copy of Manufacturer's Sticker | 55 |
| Appendix B | Discussion on Data | 57 |
| Appendix C | Contractor's Comments Procedure Modifications and Test Facility | 59 |
| Appendix D | Notice of Possible Non-Compliance | 68 |

1.0 INTRODUCTION

Tests were conducted on a 2009 Toyota Venza, 5-Door Liftback MPV, manufactured by Toyota Motor Manufacturing, Kentucky, Inc., to determine compliance with FMVSS 135 "Passenger Car Brake Systems." All tests were conducted in accordance with the U.S. D.O.T., NHTSA Laboratory Procedure TP 135-01 and/or the corresponding TRC Inc. Test Procedure that was submitted to NHTSA for their approval. The Test Procedure was clearly described in the submitted document and has not been repeated in this report.

All stops were performed manually.

All tests were conducted by TRC Inc. personnel using the following TRC facilities:

7.5-Mile Test Track

Vehicle Maximum Speed

Burnish

Heating Snubs and Hot Performance Stops

Brake Cooling and Recovery Stops

Skid Pad

Cold Effectiveness Stops

High Speed Effectiveness Stops

Stops with Engine Off

Failed ABS

Failed Variable Proportioning Valve (if applicable)

Failed Hydraulic Circuits

Brake Power Assist Unit Failures

RBS Failure (if applicable)

EMF (Battery) Failure (if applicable)

Brake Slope

Parking Brake

Average PFC during the test period was 0.92 (Skid Pad) and 0.92 (Test Track) utilizing the ASTM E1337 w/E1336 tire method.

The test vehicle was ABS equipped. Therefore, the Wheel Lock Sequence and Adhesion Utilization Tests were not performed.

This vehicle met the requirements of FMVSS 135.

DATA SHEET 1 - VEHICLE INFORMATION

VEHICLE SPECS

| | |
|---------------------------------|-------------------------------------|
| Year: 2009 | NHTSA No: C95108 |
| Mfr: TOYOTA MOTOR MANUFACTURING | GVWR (Kg): 2310 |
| Make: TOYOTA | GAWR Front(Kg): 1400 |
| Model: VENZA | GAWR Rear(Kg): 1270 |
| Body Style: MPV 5 DOOR | Wheelbase (mm): 2768.6 |
| Mfr. Date: 02/09 | Odometer: Start:163 MI. End:589 MI. |
| VIN: 4T3ZK11A89U007432 | |

BUSES ONLY

Chassis Mfg.: N/A
 Serial No.: N/A
 No. of Seats: N/A
 Manufacture Date: N/A

| | |
|---|---|
| Engine Type: GASOLINE,SEQ FI V-6 PISTON, DOHC, 24 V, W/DUAL VVT-I | Tire Size: P245/50R20 |
| Displacement: 3.5 LITER | Tire Type: LATITUDE, TOUR HP,TUBELESS RAD |
| Engine Hspwr: 268 | Tire Mfr.: MICHELIN |
| Idle Speed(rpm): 716 | GVWR Front Press.(kpa): 220 |
| Transmission Type: AUTO.6-SPD., FWD | GVWR Rear Press.(kpa): 220 |
| No. of Axles: 2 | |

BRAKE APPLY SYSTEM

| | |
|--|---------------------------------|
| Brake Series: Front:DISC Rear:DISC | Power Assist Unit: YES |
| Brake Actuation | Pwr Unit w/Accumulator: NO |
| (Hydr. Circuit Split): DIAGONAL | Pwr Asst./Pwr Unit w/Backup: NO |
| Power Unit: VACUUM | Variable Prop. System: YES |
| Anti-Skid unit Mfr: BOSCH | Anti-Skid Device: YES |
| Parking Mechanism: YES | |
| Type of Parking Unit: AUTOMATIC TRANSMISSION W/PARK DETENT | |
| Mstr Cylinder Dia(mm): 22.18 | Pedal Ratio: 3.50: 1 |

FRONT SYSTEM BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

| | |
|---|-------------------------------------|
| BRAKE TYPE: DISC | Material: CAST |
| Drum Construction: N/A | LF Drum Shoe Cage Dia.(mm): 0.00 |
| Disc Construction: CAST,VENTED | RF Drum Shoe Cage Dia.(mm): 0.00 |
| Front Brake Dia.(mm): 323.80 | LF Drum Dia. RESET(mm): 0.00 |
| Fr Disc Thickness(mm): 28.04 | RF Drum Dia. RESET(mm): 0.00 |
| Lining Construction: Bonded | |
| FRONT BRAKE COMPONENT DIMENSIONS AND CODES: | |
| Inboard (Leading) | Outboard (Trailing) |
| Width(mm): 47.68 | Width(mm): 47.62 |
| Length(mm): 143.23 | Length(mm): 143.21 |
| Thickness(mm): 11.86 | Thickness(mm): 11.96 |
| Lining Code/Color: ADVICS PV565H-FG | Lining Code/Color: ADVICS PV565H-FG |
| Hyd. Piston Dia.(mm): 45.91 (X2) | |

DATA SHEET 1 - (CONTINUED)

REAR SYSTEM

BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE: DISC

Material: CAST

Drum Construction: N/A

LR Drum Shoe Cage Dia.(mm): 0.00

Disc Construction: UNVENTED

RR Drum Shoe Cage Dia.(mm): 0.00

Lining Construction: BONDED

LR Drum Dia. RESET(mm): 0.00

Rear Brake Dia.(mm): 297.87

RR Drum Dia. RESET(mm): 0.00

Rr Disc Thickness(mm): 10.06

Lining Construction: Bonded

REAR BRAKE COMPONENT DIMENSIONS AND CODES:

Inboard (Leading)

Outboard (Trailing)

Width(mm): 36.73

Width (mm): 36.75

Length(mm): 90.55

Length (mm): 90.55

Thickness(mm): 10.01

Thickness (mm): 10.06

Lining Code/Color: AK PA561H-EE

Lining Code/Color: AK PA561H EE

Hyd Piston Dia (mm): 44.06

OTHER COMPONENT INFORMATION:

Friction-type Park Brake: N/A

Non-Service Brake Type

Parking Brake: FOOT-OPERATED

NOTE: If at any time after the test series has begun, any brake system part requires replacement or the brake system requires adjustments other than permitted in burnish and reburnish procedures, discontinue testing and notify the COTR immediately.

Technician: Jerry Inman

JERRY INMAN

Date: 5/14/09

Quality Assurance: Randy Landes

RANDY LANDES

3.0 SUMMARY OF TESTING

| | | Specification and Limit | | | | TEST RESULTS (In compliance if one stop meets requirement) | | | |
|--|---|-------------------------|-------------------------------|-------------------------------|--|--|--|---|--------------|
| TEST | Loading Conditio n | Speed (km/h) | Min. Pedal Force (N) | Max. Pedal Force (N) | Stopping Distance Requirement (m) | Shortest Stop Min. Pedal Force (N)*** | Shortest Stop Max. Pedal Force Newtons (Average – N) | Shortest Stop Stopping Distance (m) (Corrected) | PASS Fail |
| Equipment Requirements | | | | | Specified Equipment | Vehicle contains specified equipment | | | Pass |
| Vehicle Maximum Speed | LLVW | NA | | | | 182.4 km/h avg. | | | NA |
| Burnish | GVWR | 80 | | | | 200, 80 - 0 km/h stops @ 3.0 mpsps | | | NA |
| Wheel Lockup Sequence w/o ABS | GVWR | | | | Lockup of front wheels prior to rear | ABS equipped – not required. | | | NA |
| Wheel Lockup Sequence w/o ABS | LLVW | | | | | ABS equipped – not required. | | | NA |
| Adhesion Utilization w/o ABS | LLVW | | | | Rear axle adhesion utilization curve below specified value | ABS equipped – not required. | | | NA |
| Adhesion Utilization w/o ABS | GVWR | | | | | ABS equipped – not required. | | | NA |
| Cold Effectiveness | GVWR | 100 | 65 | 500 | 70 | 5 | 484.6 | 46.9 | Pass |
| High Speed Effectiveness | GVWR | 145.9 | 65 | 500 | spd. depend. – 157.3 | 5 | 470.3 | 96.4 | Pass |
| Stops with Engine Off | GVWR | 100 | 65 | 500 | 70 | 5 | 465.7 | 52.7 | Pass |
| Cold Effectiveness | LLVW | 100 | 65 | 500 | 70 | 5 | 472.6 | 43.9 | Pass |
| High Speed Effectiveness | LLVW | 145.9 | 65 | 500 | spd. depend. – 157.3 | 5 | 485.0 | 87.9 | Pass |
| Failed Antilock | LLVW | 100 | 65 | 500 | 85 | 5 | 134.7 | 52.9 | Pass |
| Failed Proportioning Valve | LLVW | 100 | 65 | 500 | 110 | 5 | NA | NA | NA |
| Failed Hydraulic Circuit #1 | LLVW | 100 | 65 | 500 | 168 | 5 | 460.9 | 75.5 | Pass |
| Failed Hydraulic Circuit #2 | LLVW | 100 | 65 | 500 | 168 | 5 | 470.4 | 85.5 | Pass |
| Failed Hydraulic Circuit #1 | GVWR | 100 | 65 | 500 | 168 | 5 | 490.8 | 80.8 | Pass |
| Failed Hydraulic Circuit #2 | GVWR | 100 | 65 | 500 | 168 | 5 | 492.7 | 96.2 | Pass |
| Failed Antilock | GVWR | 100 | 65 | 500 | 85 | 5 | 212.1 | 56.8 | Pass |
| Failed Proportioning Valve | GVWR | 100 | 65 | 500 | 110 | 5 | NA | NA | NA |
| Regenerative Brake System (RBS) Failure | GVWR | 100 | 65 | 500 | 168 | 5 | NA | NA | NA |
| Electromotive Force (EMF) – Battery Failure | GVWR | 100 | 65 | 500 | 70 | 5 | NA | NA | NA |
| Power Brake Unit Failure | GVWR | 100 | 65 | 500 | 168 | 5 | 488.6 | 108.4 | Pass |
| Parking Brake - Uphill | GVWR | - | - | 500 | Hold for 5 min.? | NA | 421.8 | Yes-Holds | Pass |
| Parking Brake - Downhill | GVWR | - | - | 500 | Hold for 5 min.? | NA | 418.0 | Yes-Holds | Pass |
| Heating Snubs | GVWR | 120-60 | NA | NA | 15 Snubs- 3.0 mpsps | 5 | 36 Vis. Avg. | NA | NA |
| Hot Performance Stop #1 | GVWR | 100 | 65 | 401 avg | 72.2 | 5 | 393.2 (298.1) | 60.6 | Pass |
| Hot Performance Stop #2 | GVWR | 100 | 65 | 500 | 89 | 5 | 520.1 (405.6) | 58.6 | Pass* |
| Brake Cooling | GVWR | 50 | NA | NA | 4 Stops - 3.0 mpsps | 5 | 44 Vis. Avg. | NA | NA |
| Recovery Performance Stop #1 | GVWR | 100 | 65 | 401 avg | One of the two stops between 34.9 and 63.3 meters. | 5 | 411.3 (313.4) | 47.5 | Pass |
| Recovery Performance Stop #2 | GVWR | 100 | 65 | 401 avg | | 5 | 403.2 (332.4) | 46.8 | |
| Final Inspection-Brake Integrity | Check components for detachment, fracture or lubricants. | | | | | No detachments or fractures-normal appear. & colr. | | | Pass |
| Final Inspection-Reservoirs/Warning Indicators | Master cylinder or brake power reservoir shall meet the volume and label requirements of S5.4.2 and S5.4.3. | | | | | Brake system has sufficient capacity and indicators are in compliance. | | | Pass |

*** Note: The Shortest Stop Minimum Pedal Force represents the minimum force value required to engage the data acquisition's recording mode. * See Appendix C.

DATA SHEET 3 - VEHICLE WEIGHT

VEHICLE: 2009 TOYOTA VENZA

NHTSA No. C95108 Date: 04/13/09

Tire Pressure(cold): Front (kpa) 220 Rear (kpa) 220
Odometer: Start 163 MI. End 589 MI.
Scale(s) Used: TRC Scales

NOTE: GVWR, LLVW and axle weights to be measured within +0% and -1%.

GVWR/GAWR INFORMATION
(From Veh. Certification Label)

GVWR(Kg): 2310
GAWR Front(Kg): 1400
GAWR Rear(Kg): 1270

UNLOADED VEHICLE WEIGHT(UVW)

L Front(Kg): 518 L Rear(Kg): 370
R Front(Kg): 508 R Rear(Kg): 360
T Front(Kg): 1026 T Rear(Kg): 730
Total UVW(Kg): 1756

TARGET LIGHT LOADED WEIGHT(LLVW):

ACTUAL LIGHT LOADED WEIGHT(LLVW):

NOTE 1: LLVW = UVW+181.4Kg

NOTE 2: Weight distributed in front passenger seat area.

NOTE 3: Neither axle load at LLVW less than at UVW; ballast as required.

L Front(Kg): 565 L Rear(Kg): 415
R Front(Kg): 553 R Rear(Kg): 405
T Front(Kg): 1118 T Rear(Kg): 820
Total LLVW(Kg): 1938

L Front(Kg): 566 L Rear(Kg): 419
R Front(Kg): 552 R Rear(Kg): 401
T Front(Kg): 1118 T Rear(Kg): 820
Total Actual Test LLVW(Kg): 1938

Load: Driver/Observer 90(Kg) + Instru. 41(Kg) + Ballast 51(Kg) = 182(Kg)

FULLY LOADED TEST WEIGHT (ACTUAL GVWR)

NOTE 1: Vehicle loaded so axle loads proportional to GAWR shown previously.

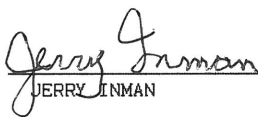
NOTE 2: But no axle weight to be less than at LLVW.

NOTE 3: If weight on any axle at LLVW exceeds the axle's proportional share of the GVWR, the load required to reach GVWR is placed so that the weight on that axle remains the same as at LLVW.

L Front(Kg): 600 L Rear(Kg): 548
R Front(Kg): 612 R Rear(Kg): 551
T Front(Kg): 1212 T Rear(Kg): 1099
Total Fully Loaded GVWR(Kg): 2311

Load: Driver/Observer 90(Kg) + Instru. 41(Kg) + Ballast 424(Kg)= 555(kg)

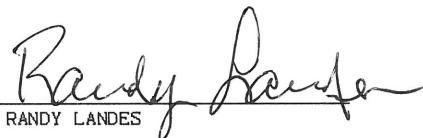
Technician:


JERRY INMAN

Date:

5/14/09

Quality Assurance:


RANDY LANDES

DATA SHEET 4 - EQUIPMENT REQUIREMENTS (S5)

SERVICE BRAKE SYSTEM (S5.1)

Vehicle equipped with a service brake system acting on all wheels? YES

Wear Adjustment (S5.1.1):

Service Brakes are compensated for wear by means of a system of automatic adjustment? YES

Describe: DISC: AUTOMATIC CLEARANCE TAKE-UP.

Wear Status (S5.1.2):

Wear status of service brakes is indicated by:

(A) Acoustic or optical device? YES

Describe: METAL TAB EMITS HIGH FREQUENCY SQUEAL WHEN WORN.

(B) Visual check outside or under vehicle? YES

Describe: FRONT AND REAR: LOOK THROUGH CALIPER.

PARKING BRAKE SYSTEM (S5.2)

Vehicle equipped with a parking brake system of a friction type with solely mechanical means to retain engagement: YES

CONTROLS (S5.3)

(A) Service brakes activated by means of a foot control? YES

(B) Parking brake control is independent of the service brake control? YES

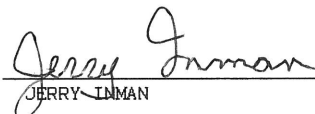
(C) Parking brake control is hand or foot operated? YES

(D) ABS, if equipped, cannot be manually disabled? YES

DATA INDICATES COMPLIANCE:

COMMENTS: NONE.

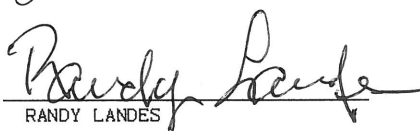
Tester/Technician:


JERRY INMAN

Date:

5/14/09

Quality Assurance:


RANDY LANDES

DATA SHEET 5 - VEHICLE MAX SPEED

VEHICLE: 2009 TOYOTA VENZA

NHTSA No. C95108

Date: 04/13/09

Ambient Temperature: 54°F

Wind Velocity: 8(MPH)

Road PFC:

Wind Direction: 11°

Odometer: Start 197(mi) End 209(mi)

TEST WEIGHT: Total (Kg): 1938

Front (Kg): 1118

Rear (Kg): 820

ESTABLISH VEHICLE MAXIMUM SPEED

VEHICLE LOAD: LLVW

IBT: N/A

GEAR: Drive

DECEL RATE: N/A

PEDAL FORCE: N/A

WHEEL LOCKUP: N/A

TEST SPEED: Maximum attainable from

INTERVAL: N/A

a standing start in 3.2 km.

1. Ballast Vehicle to LLVW
2. Accelerate at a maximum rate from a standing start for a distance of 3.2 km on a level surface.
3. Repeat in opposite direction.
4. Record speed attained in each direction and use the average of the two runs.

| | DIRECTION | MAX SPEED (km/h) | | Time 0 - 100 km/h (seconds) |
|-----------|-----------|------------------|----------|-----------------------------------|
| | | Visual | Recorded | |
| Run No. 1 | South | 183 | 182.2 | 9.62 |
| Run No. 2 | North | 183 | 182.5 | 10.83 |

AVERAGE = 182.4 km/h

COMMENTS: INV DATA, Section 0001, 04/16/09, 11:38:06

Tester/Technician:

Jerry Inman
JERRY INMAN

Date:

5/14/09

Quality Assurance:

Randy Lande
RANDY LANDE

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
Make: TOYOTA
Model: VENZA
Body Style: MPV 5 DOOR
Front Cold Tire Pressure: 220 (Kpa)
Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
10820 State Route 347
East Liberty, Ohio 43319
(937)666-2011 www.trcpg.com

Date Tested: 04/16/09

DATA SHEET 6 - BURNISH AT GVWR

Testing Conditions: INV DATA, Section 0002, 04/16/09, 14:34:37

Weather Conditions: 63°F Wind: 3 mph 360°

Start Odo.: 217 End Odo.: 451

Schedule:

Initial Brake Temperature Less Than 100°C
Initial Speed 80 km/h to zero
200 stops with transmission in gear

Performance Requirements:

Interval between runs: Time necessary to reduce IBT to 100 C° or 2 km distance, whichever occurs first.
Constant decel rate: 3.0 m/s²
Pedal force adjusted to maintain constant decel.
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

| STOP | INIT | LEFT | RIGHT | LEFT | RIGHT | MAX. | AVG. | |
|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
| # | SPD | IBT | IBT | IBT | IBT | PEDAL | PEDAL | AVG. |
| | (kph) | (°C) | (°C) | (°C) | (°C) | (N) | (N) | (m/sec ²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 79.64 | 33 | 36 | 27 | 30 | 71.35 | 41.08 | 3.09 |
| 10 | 80.82 | 99 | 92 | 90 | 89 | 53.85 | 33.86 | 3.24 |
| 20 | 80.69 | 98 | 91 | 88 | 86 | 46.22 | 29.87 | 3.07 |
| 30 | 80.30 | 95 | 86 | 84 | 83 | 46.39 | 30.16 | 3.15 |
| 40 | 80.29 | 96 | 96 | 98 | 93 | 48.88 | 33.28 | 3.11 |
| 50 | 80.35 | 98 | 93 | 96 | 91 | 47.67 | 30.92 | 3.04 |
| 60 | 79.91 | 98 | 96 | 96 | 92 | 54.87 | 34.20 | 3.07 |
| 70 | 80.88 | 97 | 94 | 93 | 89 | 66.84 | 44.28 | 3.11 |
| 80 | 81.40 | 97 | 95 | 93 | 90 | 61.14 | 40.53 | 3.01 |
| 90 | 80.96 | 99 | 95 | 92 | 90 | 66.84 | 40.53 | 3.11 |
| 100 | 80.02 | 98 | 93 | 92 | 89 | 71.28 | 37.94 | 3.26 |
| 110 | 80.33 | 99 | 97 | 92 | 88 | 58.38 | 39.04 | 3.09 |
| 120 | 79.69 | 97 | 93 | 91 | 88 | 49.00 | 34.60 | 3.08 |
| 130 | 80.32 | 97 | 97 | 93 | 90 | 58.61 | 34.66 | 3.25 |
| 140 | 81.83 | 98 | 93 | 91 | 89 | 62.99 | 41.51 | 2.94 |
| 150 | 79.90 | 99 | 94 | 92 | 91 | 57.23 | 39.50 | 3.30 |
| 160 | 80.07 | 97 | 92 | 89 | 88 | 62.24 | 36.73 | 3.06 |
| 170 | 79.91 | 98 | 96 | 91 | 88 | 58.32 | 40.94 | 3.10 |
| 180 | 81.23 | 97 | 93 | 89 | 87 | 54.06 | 38.06 | 3.09 |
| 190 | 81.04 | 98 | 97 | 88 | 86 | 48.59 | 34.03 | 2.89 |
| 200 | 81.00 | 97 | 94 | 90 | 90 | 45.66 | 33.68 | 2.97 |

COMMENTS: THIS VEHICLE ABS EQUIPPED. DATA SHEETS 7-10 NOT INCLUDED.

BRAKE ADJUSTMENT

Schedule:

Adjust service brakes; record procedure and amount adjusted.

Left Front: DISC NONE
Right Front: DISC NONE
Left Rear: DISC NONE
Right Rear: DISC NONE

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN
Recorded Data Processed by: CHUCK JENKINS
Approving Laboratory Official: RANDY LANDES

Observer: NONE
Date: 05/04/09
Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/22/09

DATA SHEET 11 - COLD EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0015, 04/22/09, 10:48:26

Weather Conditions: 48°F Wind: 18 mph 272° Start Odo.: 467 End Odo.: 472

Schedule:

Initial Brake Temperature 65 - 100 C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 70m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| STOP # | INIT SPD (kph) | LEFT FRONT | RIGHT FRONT | LEFT REAR | RIGHT REAR | ACTUAL DISTANCE (meter) | CORRECTED DISTANCE (SAE 299) (meter) | MAX. PEDAL FORCE (N) | AVG. PEDAL FORCE (N) | MAX. DECEL (m/sec ²) | AVG. DECEL (m/sec ²) |
|-----------|----------------------|---------------|----------------|--------------|---------------|-------------------------------|---|-------------------------------|-------------------------------|--|--|
| | | IBT (°C) | IBT (°C) | IBT (°C) | IBT (°C) | | | | | | |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 99.48 | 60 | 49 | 41 | 33 | 55.2 | 55.8 | 471.20 | 375.38 | 10.09 | 4.90 |
| 2 | 99.47 | 76 | 67 | 48 | 43 | 51.0 | 51.5 | 483.07 | 396.19 | 10.29 | 7.46 |
| 3 | 99.77 | 76 | 67 | 43 | 39 | 47.9 | 48.1 | 451.48 | 397.40 | 11.62 | 7.94 |
| 4 | 100.03 | 82 | 71 | 47 | 43 | 47.3 | 47.3 | 460.76 | 401.03 | 11.83 | 7.90 |
| 5 | 100.05 | 84 | 72 | 47 | 45 | 48.1 | 48.0 | 517.09 | 417.00 | 11.65 | 8.18 |
| 6 | 100.50 | 83 | 71 | 47 | 43 | 47.4 | 46.9 | 484.57 | 418.33 | 12.42 | 7.97 |

| STOP # | DRIVER VEHICLE STOP COMMENTS | | | |
|-----------|--|-----|-------|-----|
| | (Wheel Lock up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | SOUTH | YES |
| 6 | - | NOX | SOUTH | YES |

Corrected Distances are used to determine shortest stopping distance.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937) 666-2011 www.trcpg.com

Date Tested: 04/22/09

DATA SHEET 12 - HIGH SPEED EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0020, 04/22/09, 11:28:58

Weather Conditions: 50°F Wind: 13 mph 264° Start Odo: 473 End Odo: 480

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed: 80% max km/h, not greater than 160km/h
 6 stops with transmission in gear
 Target Initial Speed: 145.88 kph

Performance Requirements:

One Stop with:
 Stopping Distance less than: 157.2 meter
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | |
|-------|--------|-------|-------|-------|-------|---------|----------------------|--------------|--------------|-------------------|-------------------|
| STOP | SPD | IBT | IBT | IBT | IBT | ACTUAL | DISTANCE | PEDAL | PEDAL | MAX. | AVG. |
| # | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (SAE 299) (meter) | FORCE (N) | FORCE (N) | DECEL (m/sec²) | DECEL (m/sec²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 145.35 | 77 | 66 | 46 | 43 | 101.1 | 101.9 | 486.47 | 428.25 | 11.85 | 7.95 |
| 2 | 145.18 | 91 | 78 | 46 | 43 | 95.5 | 96.4 | 470.33 | 415.22 | 13.16 | 8.50 |
| 3 | 146.18 | 94 | 79 | 51 | 47 | 97.6 | 97.2 | 501.12 | 434.64 | 12.51 | 8.40 |
| 4 | 144.31 | 94 | 83 | 45 | 40 | 97.1 | 99.3 | 483.19 | 427.55 | 12.40 | 8.44 |
| 5 | 146.63 | 97 | 77 | 48 | 42 | 98.6 | 97.6 | 483.53 | 432.63 | 12.12 | 8.32 |
| 6 | 146.32 | 97 | 89 | 51 | 52 | 98.4 | 97.8 | 489.99 | 436.95 | 12.15 | 8.35 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|------------------------------|---|-------------------|-----------------|
| # | (Wheel Lock up | - | Direction of Stop | - Stay in Lane) |
| ===== | ===== | | | |
| 1 | - | | NOX | SOUTH YES |
| 2 | - | | NOX | SOUTH YES |
| 3 | - | | NOX | SOUTH YES |
| 4 | - | | NOX | SOUTH YES |
| 5 | - | | NOX | SOUTH YES |
| 6 | - | | NOX | SOUTH YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/22/09

DATA SHEET 13 - STOPS WITH ENGINE OFF AT GVWR

Testing Conditions: INV DATA, Section 0025, 04/22/09, 12:29:33

Weather Conditions: 52°F Wind: 15 mph 265° Start Odo.: 481 End Odo.: 487

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 70m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| STOP | INIT | LEFT | RIGHT | LEFT | RIGHT | ACTUAL | CORRECTED | MAX. | AVG. | MAX. | AVG. |
|------|--------|-------|-------|------|-------|----------|-----------|--------|--------|-----------------------|-----------------------|
| # | SPD | FRONT | FRONT | REAR | REAR | DISTANCE | (SAE 299) | PEDAL | PEDAL | DECEL | DECEL |
| | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (meter) | (N) | (N) | (m/sec ²) | (m/sec ²) |
| 1 | 100.35 | 82 | 64 | 43 | 37 | 61.5 | 61.1 | 476.85 | 430.55 | 11.30 | 6.43 |
| 2 | 100.30 | 81 | 64 | 47 | 43 | 61.0 | 60.6 | 615.04 | 449.23 | 8.09 | 6.50 |
| 3 | 100.52 | 90 | 71 | 53 | 49 | 56.9 | 56.3 | 486.47 | 434.24 | 9.32 | 6.86 |
| 4 | 99.83 | 83 | 65 | 47 | 43 | 56.6 | 56.8 | 497.43 | 424.21 | 8.90 | 7.09 |
| 5 | 100.26 | 78 | 68 | 52 | 49 | 55.3 | 55.0 | 478.40 | 420.40 | 13.79 | 7.07 |
| 6 | 99.24 | 76 | 65 | 49 | 44 | 51.9 | 52.7 | 465.66 | 414.99 | 9.92 | 7.49 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | SOUTH | YES |
| 6 | - | NOX | SOUTH | YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/22/09

DATA SHEET 14 - COLD EFFECTIVENESS AT LLVW

Testing Conditions: INV DATA, Section 0030, 04/22/09, 14:30:03

Weather Conditions: 53°F Wind: 17 mph 268° Start Odo.: 490 End Odo.: 495

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 70m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| STOP # | INIT SPD (kph) | LEFT FRONT | RIGHT FRONT | LEFT REAR | RIGHT REAR | ACTUAL DISTANCE (meter) | CORRECTED DISTANCE (SAE 299) (meter) | MAX. PEDAL FORCE (N) | AVG. PEDAL FORCE (N) | MAX. DECEL (m/sec ²) | AVG. DECEL (m/sec ²) |
|-----------|----------------------|---------------|----------------|--------------|---------------|-------------------------------|---|-------------------------------|-------------------------------|--|--|
| | | IBT (°C) | IBT (°C) | IBT (°C) | IBT (°C) | | | | | | |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 100.82 | 74 | 72 | 51 | 47 | 46.6 | 45.9 | 454.26 | 395.94 | 11.49 | 8.51 |
| 2 | 99.60 | 84 | 79 | 46 | 42 | 43.5 | 43.9 | 472.62 | 417.25 | 14.07 | 9.12 |
| 3 | 100.35 | 88 | 78 | 43 | 39 | 44.4 | 44.1 | 469.50 | 365.97 | 14.17 | 7.55 |
| 4 | 99.23 | 90 | 77 | 42 | 39 | 43.4 | 44.1 | 498.55 | 398.60 | 15.46 | 8.42 |
| 5 | 98.95 | 90 | 76 | 40 | 38 | 44.4 | 45.3 | 496.99 | 400.10 | 13.90 | 8.23 |
| 6 | 98.92 | 92 | 79 | 41 | 39 | 43.9 | 44.9 | 474.18 | 404.72 | 12.83 | 9.26 |

| STOP # | DRIVER VEHICLE STOP COMMENTS | | |
|-----------|------------------------------|---------------------|-----------------|
| | (Wheel Lock-Up | - Direction of Stop | - Stay in Lane) |
| 1 | - | NOX | SOUTH YES |
| 2 | - | NOX | SOUTH YES |
| 3 | - | NOX | SOUTH YES |
| 4 | - | NOX | SOUTH YES |
| 5 | - | NOX | SOUTH YES |
| 6 | - | NOX | SOUTH YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/22/09

DATA SHEET 15 - HIGH SPEED EFFECTIVENESS AT LLVW

Testing Conditions: INV DATA, Section 0035, 04/22/09, 14:56:20

Weather Conditions: 55°F Wind: 23 mph 264° Start Odo.: 496 End Odo.: 501

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed: 80% max km/h
 6 stops with transmission in gear

Performance Requirements:

One Stop with:
 Stopping Distance less than 157.2m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | MAX. | AVG. |
|-------|--------|-------|-------|-------|-------|---------|-----------|--------|--------|-------|-----------------------|-----------------------|
| STOP | INIT | FRONT | FRONT | REAR | REAR | ACTUAL | DISTANCE | PEDAL | PEDAL | | DECEL | DECEL |
| # | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (SAE 299) | FORCE | FORCE | | (m/sec ²) | (m/sec ²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 146.71 | 64 | 52 | 28 | 27 | 91.2 | 90.1 | 595.21 | 442.36 | 16.04 | 9.98 | |
| 2 | 142.81 | 98 | 79 | 42 | 39 | 88.3 | 92.1 | 432.89 | 344.84 | 13.94 | 9.21 | |
| 3 | 146.41 | 96 | 73 | 39 | 35 | 91.2 | 90.5 | 466.44 | 388.61 | 15.09 | 7.75 | |
| 4 | 146.30 | 98 | 75 | 38 | 34 | 88.4 | 87.9 | 485.04 | 407.43 | 14.63 | 9.34 | |
| 5 | 146.25 | 97 | 78 | 37 | 36 | 89.9 | 89.4 | 484.11 | 417.02 | 15.78 | 9.13 | |
| 6 | 144.91 | 89 | 72 | 33 | 32 | 89.9 | 91.1 | 499.30 | 427.64 | 13.62 | 9.09 | |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | SOUTH | YES |
| 6 | - | NOX | SOUTH | YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
Make: TOYOTA
Model: VENZA
Body Style: MPV 5 DOOR
Front Cold Tire Pressure: 220 (Kpa)
Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
10820 State Route 347
East Liberty, Ohio 43319
(937) 666-2011 www.trcpg.com

Date Tested: 04/23/09

DATA SHEET 16 - ANTILOCK FUNCTIONAL FAILURE AT LLVW

Testing Conditions: INV DATA, Section 0040, 04/23/09, 08:45:22

Weather Conditions: 43°F Wind: 3 mph 360° Start Odo.: 513 End Odo.: 513

Schedule:

Initial Brake Temperature: 65-100°C
Initial Speed 100 km/h to zero
6 stops with transmission in neutral

Performance Requirements:

One Stop with:
Stopping Distance less than 85m
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

| STOP # | INIT SPD (kph) | LEFT FRONT (°C) | RIGHT FRONT (°C) | LEFT REAR (°C) | RIGHT REAR (°C) | ACTUAL DISTANCE (meter) | CORRECTED DISTANCE (SAE 299) (meter) | MAX. PEDAL FORCE (N) | AVG. PEDAL FORCE (N) | MAX. DECEL (m/sec²) | AVG. DECEL (m/sec²) |
|-----------|----------------------|-----------------------|------------------------|----------------------|-----------------------|-------------------------------|---|-------------------------------|-------------------------------|---------------------------|---------------------------|
| | | IBT | IBT | IBT | IBT | | | | | | |
| 1 | 100.11 | 70 | 73 | 39 | 36 | 52.8 | 52.7 | 185.24 | 116.61 | 10.32 | 7.19 |
| 2 | 99.34 | 71 | 74 | 37 | 36 | 58.3 | 59.0 | 129.59 | 104.79 | 9.29 | 6.90 |
| 3 | 99.76 | 81 | 85 | 47 | 44 | 55.0 | 55.3 | 155.19 | 94.93 | 9.41 | 6.97 |
| 4 | 100.43 | 89 | 92 | 49 | 47 | 55.3 | 54.9 | 128.14 | 101.27 | 9.29 | 7.02 |
| 5 | 99.19 | 94 | 98 | 54 | 52 | 52.0 | 52.9 | 134.72 | 103.35 | 9.81 | 7.31 |
| 6 | 99.56 | 86 | 92 | 50 | 46 | 52.9 | 53.3 | 149.54 | 98.85 | 9.44 | 7.00 |

| STOP # | DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
|-----------|--|-----|-------|-----|
| 1 | - | LRX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | SOUTH | YES |
| 6 | - | NOX | SOUTH | YES |

Comments: See Appendix C.

How was the ABS failure induced: REMOVED HARNESS FROM ABS ECU UNIT

Is brake system indicator lamp activated: YES (X) NO ()

Vehicle equipped with ABS integral variable proportioning valve. Cannot separately fail. Data Sheet 17 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/23/09

DATA SHEET 18 - HYDRAULIC CIRCUIT FAILURE #1 AT LLVW

Testing Conditions: INV DATA, Section 0050, 04/23/09, 12:25:30

Weather Conditions: 54°F Wind: 2 mph 109° Start Odo.: 517 End Odo.: 520

Method of simulating failure: Disconnected Brake Line @ M/C Front Port

System Portion Failed: LF & RR

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed 100 km/h to zero
 4 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 168m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | |
|-------|--------|-------|-------|-------|-------|----------|-----------|--------|--------|----------|----------|
| | INIT | FRONT | FRONT | REAR | REAR | ACTUAL | DISTANCE | PEDAL | PEDAL | MAX. | AVG. |
| STOP | SPD | IBT | IBT | IBT | IBT | DISTANCE | (SAE 299) | FORCE | FORCE | DECEL | DECEL |
| # | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (meter) | (N) | (N) | (m/sec²) | (m/sec²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 99.51 | 16 | 78 | 44 | 18 | 87.8 | 88.7 | 500.52 | 365.46 | 9.24 | 4.80 |
| 2 | 99.05 | 26 | 97 | 56 | 20 | 76.1 | 77.6 | 499.43 | 392.51 | 10.29 | 5.17 |
| 3 | 99.30 | 30 | 98 | 61 | 21 | 80.3 | 81.4 | 495.74 | 392.28 | 9.91 | 5.14 |
| 4 | 100.37 | 31 | 94 | 58 | 21 | 76.1 | 75.5 | 460.90 | 353.46 | 9.89 | 5.15 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |

Force Needed to Activate Brake Failure Lamp (N): N/A
 Fluid Removed (mL) to Activate Brake Failure Lamp: 243

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937) 666-2011 www.trcpg.com

Date Tested: 04/23/09

DATA SHEET 19 - HYDRAULIC CIRCUIT FAILURE #2 AT LLVW

Testing Conditions: INV DATA, Section 0055, 04/23/09, 13:54:26

Weather Conditions: 58°F Wind: 7 mph 176° Start Odo.: 523 End Odo.: 526

Method of simulating failure: Disconnected Brake Line @ M/C Rear Port

System Portion Failed: RF & LR

Schedule:

Initial Brake Temperature 65-100°C
 Initial Speed 100 km/h to zero
 4 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 168m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | |
|-------|--------|-------|-------|-------|-------|----------|-----------|--------|--------|-----------------------|-----------------------|
| STOP | INIT | FRONT | FRONT | REAR | REAR | ACTUAL | DISTANCE | PEDAL | PEDAL | MAX. | AVG. |
| # | SPD | IBT | IBT | IBT | IBT | DISTANCE | (SAE 299) | FORCE | FORCE | DECEL | DECEL |
| | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (meter) | (N) | (N) | (m/sec ²) | (m/sec ²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 99.25 | 75 | 28 | 23 | 51 | 88.3 | 89.6 | 430.74 | 372.78 | 7.01 | 4.49 |
| 2 | 99.10 | 93 | 26 | 23 | 54 | 85.2 | 86.7 | 460.96 | 411.36 | 8.46 | 4.64 |
| 3 | 100.17 | 94 | 24 | 23 | 57 | 85.8 | 85.5 | 470.42 | 420.76 | 7.90 | 4.65 |
| 4 | 100.66 | 97 | 24 | 22 | 54 | 88.2 | 87.1 | 492.39 | 437.66 | 7.76 | 4.47 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |

Force Needed to Activate Brake Failure Lamp (N): N/A
 Fluid Removed (mL) to Activate Brake Failure Lamp: 243

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 20 - HYDRAULIC CIRCUIT FAILURE #1 AT GVWR

Testing Conditions: INV DATA, Section 0060, 04/24/09, 09:08:56

Weather Conditions: 70°F Wind: 18 mph 228° Start Odo.: 541 End Odo.: 544

Method of simulating failure: Disconnected Brake Line @ M/C Front Port

System Portion Failed: LF & RR

Schedule:

Initial Brake Temperature 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 168m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | |
|-------|--------|-------|-------|-------|-------|----------|-----------|--------|--------|----------|----------|
| | INIT | FRONT | FRONT | REAR | REAR | ACTUAL | DISTANCE | PEDAL | PEDAL | MAX. | AVG. |
| STOP | SPD | IBT | IBT | IBT | IBT | DISTANCE | (SAE 299) | FORCE | FORCE | DECEL | DECEL |
| # | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (meter) | (N) | (N) | (m/sec²) | (m/sec²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 99.27 | 30 | 71 | 55 | 23 | 86.4 | 87.6 | 439.57 | 384.95 | 9.59 | 4.69 |
| 2 | 100.42 | 34 | 79 | 71 | 26 | 82.9 | 82.3 | 483.34 | 416.21 | 8.76 | 4.86 |
| 3 | 99.39 | 36 | 88 | 79 | 27 | 78.6 | 79.6 | 592.85 | 396.77 | 8.53 | 4.92 |
| 4 | 100.21 | 37 | 93 | 82 | 28 | 81.1 | 80.8 | 490.83 | 418.05 | 9.16 | 4.96 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/23/09

DATA SHEET 21 - HYDRAULIC CIRCUIT FAILURE #2 AT GVWR

Testing Conditions: INV DATA, Section 0065, 04/23/09, 14:50:49

Weather Conditions: 59°F Wind: 9 mph 141° Start Odo.: 530 End Odo.: 533

Method of simulating failure: Disconnected Brake Line @ M/C Rear Port

System Portion Failed: RF & LR

Schedule:

Initial Brake Temperature 65-100°C
 Initial Speed 100 km/h to zero
 4 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 168m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | |
|-------|--------|-------|-------|-------|-------|----------|-----------|--------|--------|----------|----------|
| | INIT | FRONT | FRONT | REAR | REAR | ACTUAL | DISTANCE | PEDAL | PEDAL | MAX. | AVG. |
| STOP | SPD | IBT | IBT | IBT | IBT | DISTANCE | (SAE 299) | FORCE | FORCE | DECEL | DECEL |
| # | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (meter) | (N) | (N) | (m/sec²) | (m/sec²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 100.94 | 73 | 23 | 22 | 51 | 98.0 | 96.2 | 492.74 | 439.28 | 7.77 | 4.04 |
| 2 | 100.31 | 96 | 24 | 23 | 62 | 97.0 | 96.4 | 478.26 | 423.48 | 6.56 | 4.07 |
| 3 | 100.57 | 93 | 23 | 22 | 56 | 100.4 | 99.3 | 484.38 | 434.26 | 7.88 | 4.11 |
| 4 | 98.78 | 94 | 24 | 24 | 59 | 98.1 | 100.6 | 488.64 | 435.01 | 7.42 | 3.95 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 22 - ANTILOCK FUNCTIONAL FAILURE AT GVWR

Testing Conditions: INV DATA, Section 0070, 04/24/09, 10:29:11

Weather Conditions: 74°F Wind: 18 mph 236° Start Odo.: 546 End Odo.: 546

Schedule:

Initial Brake Temperature 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 85m
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| | | LEFT | RIGHT | LEFT | RIGHT | | CORRECTED | MAX. | AVG. | | |
|-------|--------|-------|-------|-------|-------|---------|----------------------|--------------|--------------|-------------------|-------------------|
| STOP | SPD | IBT | IBT | IBT | IBT | ACTUAL | DISTANCE | PEDAL | PEDAL | MAX. | AVG. |
| # | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (SAE 299) (meter) | FORCE (N) | FORCE (N) | DECEL (m/sec²) | DECEL (m/sec²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 99.46 | 69 | 77 | 58 | 51 | 68.3 | 69.1 | 167.42 | 129.53 | 10.55 | 5.96 |
| 2 | 99.56 | 71 | 76 | 56 | 48 | 56.3 | 56.8 | 212.11 | 138.12 | 9.05 | 7.17 |
| 3 | 99.97 | 81 | 84 | 62 | 55 | 60.9 | 60.9 | 180.91 | 129.24 | 9.42 | 6.67 |
| 4 | 100.84 | 86 | 87 | 62 | 57 | 60.8 | 59.8 | 181.49 | 128.95 | 8.77 | 6.68 |
| 5 | 99.33 | 95 | 94 | 67 | 63 | 57.7 | 58.4 | 195.22 | 133.97 | 9.10 | 6.99 |
| 6 | 99.84 | 94 | 91 | 64 | 61 | 57.3 | 57.5 | 181.72 | 145.16 | 9.00 | 7.17 |

| STOP | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|--|-------|-------|-------|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | ===== | ===== | ===== |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | SOUTH | YES |
| 6 | - | NOX | SOUTH | YES |

Comments: See Appendix C.

How was the ABS failure induced: REMOVED HARNESS FROM ABS ECU UNIT

Is brake system indicator lamp activated: YES (X) NO ()

Vehicle equipped with ABS integral variable proportioning valve. Cannot separately fail. Data Sheet 23 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 24 - BRAKE POWER UNIT OR PWR ASSIST UNIT IN/OP AT GVWR

Testing Conditions: INV DATA, Section 0080, 04/24/09, 12:29:59

Weather Conditions: 80°F Wind: 19 mph 205° Start Odo.: 548 End Odo.: 552

Failure Simulation: Disconnect primary source of power.

Method of rendering inoperative: Removed Engine Vacuum Hose at Booster

Schedule:

Initial Brake Temperature 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than **168m**
 Pedal force between 65N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| STOP # | INIT SPD | LEFT FRONT IBT | RIGHT FRONT IBT | LEFT REAR IBT | RIGHT REAR IBT | ACTUAL DISTANCE | CORRECTED DISTANCE | MAX. PEDAL FORCE | AVG. PEDAL FORCE | MAX. DECEL | AVG. DECEL |
|-----------|-------------|----------------------|-----------------------|---------------------|----------------------|--------------------|-----------------------|------------------------|------------------------|---------------|---------------|
| | (kph) | (°C) | (°C) | (°C) | (°C) | (meter) | (SAE 299) (meter) | (N) | (N) | (m/sec²) | (m/sec²) |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| 1 | 100.63 | 84 | 76 | 57 | 57 | 118.0 | 116.5 | 513.79 | 465.29 | 5.16 | 3.65 |
| 2 | 100.06 | 87 | 78 | 57 | 56 | 111.8 | 111.7 | 495.45 | 461.60 | 5.28 | 3.71 |
| 3 | 101.03 | 92 | 86 | 61 | 58 | 110.7 | 108.4 | 488.59 | 458.71 | 5.31 | 3.76 |
| 4 | 100.44 | 81 | 67 | 51 | 49 | 115.7 | 114.7 | 487.95 | 460.04 | 4.77 | 3.52 |
| 5 | 99.59 | 86 | 74 | 56 | 53 | 105.2 | 106.1 | 540.84 | 475.67 | 5.22 | 3.83 |
| 6 | 99.34 | 96 | 81 | 61 | 58 | 109.3 | 110.7 | 479.70 | 450.98 | 7.14 | 3.67 |

| STOP # | DRIVER VEHICLE STOP COMMENTS | | | |
|-----------|--|-----|-------|-----|
| | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| ===== | ===== | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | SOUTH | YES |
| 6 | - | NOX | SOUTH | YES |

Is the brake system indicator lamp activated: YES () NO (X)

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 25 - PARKING BRAKE AT GVWR

Testing Conditions: INV DATA, Section 0085, 04/24/09, 14:17:44

Parking brake: AUTOMATIC TR Non-service type: FOOT-OPERATED

Service type: N/A

Weather Conditions: 80°F Wind: 18 mph 208°

Start Odo.: 557

End Odo.: 557

Test Weight: Total:2311kg

Front:1212kg

Rear:1099kg

Schedule:

Initial Brake Temperature <100°C or (Ambient temp.
 if non-service brake type materials)

Loaded to GVWR with transmission in neutral

Drive onto 20% slope in forward and reverse directions.

Performance Requirements:

Up to Three Applies in each direction:

Parking brake must hold the vehicle stationary
 in both directions for 5 minutes each.

Pedal force: Hand control: <400 N

Foot control: <500 N

NOTE: For vehicles with parking brake systems not utilizing the
 service brake friction elements, the friction elements of such systems
 are to be burnished prior to parking brake tests according to the
 manufacturer's published recommendation as furnished to the purchaser.
 If no recommendations are furnished, test the system in an unburnished
 condition. If recommendations are furnished, record method used.

| | MAX SERVICE | MAX P-BRAKE | LEFT REAR | RIGHT REAR | AVG REAR | | DRIVER VEHICLE STOP COMMENTS | | | |
|-------|----------------|----------------|--------------|---------------|-------------|---|---|----------|-------|-----|
| APPLY | FORCE | FORCE | IBT | IBT | IBT | | (Direction of Stop (Up/Down) - Brake holds/fails) | | | |
| # | (N) | (N) | (°C) | (°C) | (°C) | | ===== | | | |
| 1 | 57.2 | 421.8 | 50 | 48 | 49.2 | - | 0 REAPPLY | UPHILL | HOLDS | 20% |
| 2 | 50.2 | 418.0 | 38 | 39 | 38.6 | - | 0 REAPPLY | DOWNHILL | HOLDS | 20% |

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN

Observer: NONE

Recorded Data Processed by: CHUCK JENKINS

Date: 05/04/09

Approving Laboratory Official: RANDY LANDES

Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937) 666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 26 - HEATING SNUBS AT GVWR

Testing Conditions: INV DATA, Section 0090, 04/24/09, 15:33:11

Schedule:

Conduct 15 snubs from 120 Km/h or 80% Vmax, whichever is slower, to 1/2 of initial speed.
 Attain required decel in 1 second and maintain that decel.
 Interval between snubs is 45 seconds and WOT to initial speed.

Performance Requirements:

Initial IBT for first snub is 55-65°C
 Maintain 3.0 m/s/s deceleration
 Vehicle Must stay in lane of 3.5m

| SNUB # | AVG. DECEL (m/sec²) | Time Between Snubs (second) | AVG. PEDAL FORCE (N) | LEFT FRONT IBT (°C) | RIGHT FRONT IBT (°C) | LEFT REAR IBT (°C) | RIGHT REAR IBT (°C) | INIT SPD (kph) |
|--------|---------------------|-----------------------------|----------------------|---------------------|----------------------|--------------------|---------------------|----------------|
| 1 | 3.47 | --NA-- | 45.44 | 58 | 60 | 44 | 45 | 119.77 |
| 2 | 3.19 | 48 | 37.26 | 99 | 95 | 79 | 81 | 119.44 |
| 3 | 3.23 | 42 | 38.81 | 137 | 134 | 108 | 109 | 120.11 |
| 4 | 3.18 | 45 | 35.64 | 169 | 172 | 133 | 132 | 120.19 |
| 5 | 3.07 | 45 | 34.20 | 191 | 203 | 155 | 151 | 119.64 |
| 6 | 3.12 | 47 | 31.89 | 209 | 227 | 175 | 170 | 119.38 |
| 7 | 3.12 | 43 | 37.43 | 226 | 246 | 193 | 188 | 119.20 |
| 8 | 3.17 | 45 | 35.35 | 247 | 258 | 211 | 206 | 120.22 |
| 9 | 3.12 | 44 | 34.66 | 266 | 263 | 223 | 223 | 120.19 |
| 10 | 3.13 | 47 | 33.97 | 275 | 267 | 235 | 238 | 119.02 |
| 11 | 3.15 | 44 | 32.41 | 282 | 278 | 248 | 253 | 119.95 |
| 12 | 3.22 | 45 | 39.16 | 282 | 287 | 257 | 262 | 119.74 |
| 13 | 3.16 | 45 | 31.08 | 276 | 299 | 266 | 268 | 119.83 |
| 14 | 3.10 | 45 | 31.66 | 272 | 306 | 271 | 273 | 119.42 |
| 15 | 3.11 | 46 | 35.12 | 269 | 308 | 277 | 278 | 120.79 |

| STOP # | WHEEL LOCK-UP | DRIVER | VEHICLE | SNUB COMMENTS |
|--------|-----------------|--------|-------------------|-----------------|
| # | (Wheel Lock-Up) | - | Direction of Stop | - Stay in Lane) |
| 1 | - | NOX | EAST | YES |
| 2 | - | NOX | SOUTH | YES |
| 3 | - | NOX | SOUTH | YES |
| 4 | - | NOX | SOUTH | YES |
| 5 | - | NOX | WEST | YES |
| 6 | - | NOX | WEST | YES |
| 7 | - | NOX | NORTH | YES |
| 8 | - | NOX | NORTH | YES |
| 9 | - | NOX | NORTH | YES |
| 10 | - | NOX | EAST | YES |
| 11 | - | NOX | SOUTH | YES |
| 12 | - | NOX | SOUTH | YES |
| 13 | - | NOX | SOUTH | YES |
| 14 | - | NOX | WEST | YES |
| 15 | - | NOX | WEST | YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 27 - HOT PERFORMANCE AT GVWR

Testing Conditions: INV DATA, Section 0095, 04/24/09, 15:44:09

Schedule:

Make 2 stops from 100 kph
 Pedal Force: 1st stop is done with an average force less than the average recorded in the shortest GVWR Cold Effectiveness stop.
 2nd stop is done with a force less than 500 N.
 No Lock-Up allowed longer than 0.1 sec above 15 km/h.

Distance Requirements are based on the following:

shortest stop in Data Sheet 11 is: 4
 Initial speed of stop: 100.03 (kph)
 Actual distance of stop: 47.3 (meter)
 Average pedal force: 401.0 (N)

Performance Requirements:

Stop Number 1 must be less than: 72.2 (meter)
 In addition the stopping distance for at least one of the of the two hot stops must be less than: 89 (meter)

| STOP # | INIT SPD (kph) | LEFT FRONT | RIGHT FRONT | LEFT REAR | RIGHT REAR | ACTUAL DISTANCE (meter) | CORRECTED DISTANCE (SAE 299) (meter) | MAX. PEDAL FORCE (N) | AVG. PEDAL FORCE (N) | MAX. DECEL (m/sec ²) | AVG. DECEL (m/sec ²) |
|--------|----------------|------------|-------------|-----------|------------|-------------------------|--------------------------------------|----------------------|----------------------|----------------------------------|----------------------------------|
| | | IBT (°C) | IBT (°C) | IBT (°C) | IBT (°C) | | | | | | |
| 1 | 99.79 | 284 | 322 | 291 | 294 | 60.4 | 60.6 | 393.20 | 298.10 | 10.03 | 6.19 |
| 2 | 98.68 | 306 | 343 | 299 | 302 | 57.1 | 58.6 | 520.07 | 405.60 | 11.16 | 6.20 |

| STOP # | DRIVER VEHICLE STOP COMMENTS | | | |
|--------|--|-----|-------|-----|
| # | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| 1 | - | NOX | NORTH | YES |
| 2 | - | NOX | NORTH | YES |

Comments: See Appendix C.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN
 Recorded Data Processed by: CHUCK JENKINS
 Approving Laboratory Official: RANDY LANDES

Observer: NONE
 Date: 05/04/09
 Date: 05/08/09

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 28 - BRAKE COOLING STOPS AT GVWR

Testing Conditions: INV DATA, Section 0100, 04/24/09, 15:46:56

Schedule:

Initial Brake Temperature:
 Achieved on completing Hot Performance
 Initial Speed 50 km/h to zero
 4 stops with transmission in gear

Performance Requirements:

Constant Decel rate: 3.0 m/s/s
 Pedal force adjusted as necessary
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 3.5m

| STOP # | INIT SPD (kph) | AVG. DECEL (m/sec ²) | AVG. PEDAL FORCE (N) | LEFT FRONT IBT (°C) | RIGHT FRONT IBT (°C) | LEFT REAR IBT (°C) | RIGHT REAR IBT (°C) |
|--------|----------------|----------------------------------|----------------------|---------------------|----------------------|--------------------|---------------------|
| 1 | 50.55 | 2.59 | 45.73 | 267 | 283 | 234 | 248 |
| 2 | 50.52 | 2.67 | 42.27 | 213 | 214 | 181 | 203 |
| 3 | 50.84 | 2.66 | 44.00 | 177 | 175 | 153 | 170 |
| 4 | 50.05 | 2.74 | 43.60 | 145 | 143 | 133 | 140 |

| STOP # | DRIVER | VEHICLE | STOP COMMENTS |
|--------|----------------|---------------------|-----------------|
| | (Wheel Lock up | - Direction of Stop | - Stay in Lane) |
| 1 | - | NOX | NORTH YES |
| 2 | - | NOX | NORTH YES |
| 3 | - | NOX | EAST YES |
| 4 | - | NOX | SOUTH YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

| | |
|---|----------------|
| Driver: JERRY INMAN | Observer: NONE |
| Recorded Data Processed by: CHUCK JENKINS | Date: 05/04/09 |
| Approving Laboratory Official: RANDY LANDES | Date: 05/08/09 |

Vehicle: 2009 TOYOTA MOTOR MA NHTSA NUMBER: C95108
 Make: TOYOTA
 Model: VENZA
 Body Style: MPV 5 DOOR
 Front Cold Tire Pressure: 220 (Kpa)
 Rear Cold Tire Pressure: 220 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2011 www.trcpg.com

Date Tested: 04/24/09

DATA SHEET 29 - RECOVERY PERFORMANCE AT GVWR

Testing Conditions: INV DATA, Section 0105, 04/24/09, 15:52:56

Weather Conditions: 81°F Wind: 18 mph 206° Start Odo.: 560 End Odo.: 582

Schedule:

Make 2 stops from 100 kph

Pedal Force: Both stops are performed with an average force less than the average recorded in the shortest GVWR Cold Effectiveness stop.

Performance Requirements:

One of the two stops must be within the following limits:

Upper limit of corrected stopping distance: 63.3 (meter)

Lower limit of corrected stopping distance: 34.9 (meter)

No Lock-Up allowed longer than 0.1 sec above 15 km/h.

Distance Requirements are based on the following:

shortest stop in Data Sheet 11 is: Stop4

Initial speed of stop: 100.03 (kph)

Actual distance of stop: 47.3 (meter)

Average pedal force: 401.0 (N)

| STOP # | INIT SPD (kph) | LEFT FRONT | RIGHT FRONT | LEFT REAR | RIGHT REAR | ACTUAL DISTANCE (meter) | CORRECTED DISTANCE (SAE 299) (meter) | MAX. PEDAL FORCE (N) | AVG. PEDAL FORCE (N) | MAX. DECEL (m/sec ²) | AVG. DECEL (m/sec ²) |
|--------|----------------|------------|-------------|-----------|------------|-------------------------|--------------------------------------|----------------------|----------------------|----------------------------------|----------------------------------|
| | | IBT (°C) | IBT (°C) | IBT (°C) | IBT (°C) | | | | | | |
| 1 | 99.90 | 139 | 137 | 131 | 134 | 47.4 | 47.5 | 411.25 | 313.44 | 13.34 | 8.10 |
| 2 | 100.38 | 162 | 164 | 144 | 147 | 47.1 | 46.8 | 403.18 | 332.41 | 17.33 | 7.89 |

| STOP # | DRIVER VEHICLE STOP COMMENTS | | | |
|--------|--|-----|-------|-----|
| | (Wheel Lock-Up - Direction of Stop - Stay in Lane) | | | |
| 1 | - | NOX | SOUTH | YES |
| 2 | - | NOX | SOUTH | YES |

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JERRY INMAN Observer: NONE
 Recorded Data Processed by: CHUCK JENKINS Date: 05/04/09
 Approving Laboratory Official: RANDY LANDES Date: 05/08/09

DATA SHEET 30 (Part 1 of 5)
6.0 Test Completion Inspection (7.17)

VEHICLE: 2009 Toyota Venza NHTSA NO.: C95108 ODO.: 589 mi. DATE: 04/29/09

System Integrity (S5.6)

Each vehicle shall meet the complete performance requirements of this standard without:

(a) Detachment or fracture of any component of the braking system such as brake springs and brake shoes or disc pad facings, other than minor cracks, that do not impair attachment of the friction facings. All mechanical components of the braking system shall be intact and functional. Friction facing tearout (complete detachment of lining) shall not exceed 10 percent of the lining on any single frictional element.

(b) Any visible brake fluid or lubricant on the friction surface of the brake or leakage at the master cylinder or brake power unit reservoir cover, seal, and filler openings.

| Friction Material Condition: Primary/Inner | | Friction Material Condition: Secondary/Outer | |
|---|---------------------------|---|---------------------------|
| LF | Normal Appearance & Color | LF | Normal Appearance & Color |
| RF | Normal Appearance & Color | RF | Normal Appearance & Color |
| LR | Normal Appearance & Color | LF | Normal Appearance & Color |
| RR | Normal Appearance & Color | RR | Normal Appearance & Color |
| Drum (or Rotor) Condition: | | Brake Fluid/Lubricant Inside Brakes: | |
| LF | Normal Appearance & Color | LF | None |
| RF | Normal Appearance & Color | RF | None |
| LR | Normal Appearance & Color | LR | None |
| RR | Normal Appearance & Color | RR | None |
| Hydraulic Component Condition: | | Mechanical Component Condition: | |
| LF | Good | Brk/Pedal | Good |
| RF | Good | Power Brk | Good |
| LR | Good | Stop/Lamp | Good |
| RR | Good | Linkage | Good |
| M/Cyl | Good | Other | NA |

COMPLIANCE: Yes X No
 Comments: None.

Technician: Jerry Inman

DATA SHEET 30 (Part 2 of 5)

TEST COMPLETION INSPECTION (S7.17)

VEHICLE: 2009 Toyota Venza;

NHTSA NO.: C95108;

GVWR: 2310 kg

MASTER CYLINDER RESERVOIR:

| DATE | 04/29/09 | Requirements | Pass | Fail |
|---|------------|--|------|------|
| Reservoir Compartments (S5.4.1) | | | | |
| (1) Does master cylinder have a reservoir compartment for each brake subsystem? | <u>Yes</u> | Master cylinder shall have a reservoir compartment for each subsystem. | X | |
| | No | | | |
| (2) Does loss of fluid in one compartment result in complete loss from another compartment? | Yes | Loss of fluid from one compartment shall not cause complete loss from another compartment. | X | |
| | <u>No</u> | | | |
| Reservoir Capacity (S5.4.2) | | | | |
| Shall conform to requirements (1) or (2), state units: | | | | |
| (1) For reservoirs having completely separate compartments for each subsystem (two separate, independent reservoirs): | | | | |
| Subsystem 1 Subsystem reservoir capacity | | Each compartment (reservoir) shall have a minimum capacity equivalent to the fluid displacement resulting when all wheel cylinders or caliper pistons serviced by that independent compartment/reservoir moves from a new lining, fully retracted position to a fully worn, properly adjusted, fully applied position. (Use Data Sheet 31 and Appendix 1A) | NA | NA |
| Subsystem 1 Fluid displaced from new to worn lining | | | | |
| Subsystem 2 Subsystem reservoir capacity | | | NA | NA |
| Subsystem 2 Fluid displaced from new to worn lining | | | | |
| 2) For reservoirs utilizing a portion of the reservoir for a common supply to two or more subsystems: | | | | |
| Total minimum capacity for the entire master cylinder reservoir (includes individual compartment reservoirs) | 393 ml | Shall have total minimum capacity for entire reservoir for displacement resulting from all subsystem wheel cylinders or caliper positions moving from new lining to full worn condition as above. | X | |
| Fluid displaced from new to worn linings (ALL linings) | 51.4 ml* | | | |
| *Value calculated from Data Sheet 31 | | | | |

Comments: *See Appendix C.

Technician: Jerry Inman

DATA SHEET 30 (Part 3 of 5)
TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2009 Toyota Venza;

NHTSA NO.: C95108;

GVWR: 2310 kg

MASTER CYLINDER RESERVOIR:

| DATE | 04/29/09 | Requirements | Pass | Fail |
|--|-----------|--|------|------|
| Master Cylinder Piston Displacement(S5.4.2) [If Common Reservoir Supply - continued from previous page] | | | | |
| Fluid displaced by three strokes of master cylinder piston for Subsystem No. 1. | 29.0 ml | Individual partial compartments of reservoir shall each have a minimum of fluid equal to at least the volume displaced by the master cylinder piston servicing the subsystem during a <u>full stroke</u> of the piston. NOTE: Procedure uses three strokes to ensure an accurate measurement. | | |
| Fluid displaced by three strokes of master cylinder piston for Secondary (Subsystem No. 2) | 30.0 ml | | | |
| Fluid displaced per stroke, Subsystem No. 1. | 9.7 ml | | | |
| Fluid displaced per stroke, Subsystem No. 2. | 10.0 ml | | | |
| Fluid available in partial compartment Subsystem No. 1 | 37.0 ml | | X | |
| Fluid available in partial compartment Subsystem No. 2 | 35.0 ml | | X | |
| Brake Power Unit Reservoir (S5.4.2) | | | | |
| Volume displaced in charging system piston or accumulator to normal operating pressure plus wheel cylinder or caliper piston displacement. | | Shall have a capacity at least equal to fluid displacement required to charge the system pistons on accumulators to normal operating pressure <u>plus</u> displacement when wheel cylinders or caliper pistons move from new lining to full worn condition as above. | NA | |
| Reservoir Labeling (S5.4.3) | | | | |
| Exact copy of reservoir label: On top of master cylinder reservoir: <u>WARNING:</u> <u>CLEAN FILLER CAP BEFORE REMOVING.</u> <u>USE ONLY DOT 3 BRAKE FLUID FROM A SEALED CONTAINER.</u> | | Label shall read: "Warning, clean filler cap before removing; use only * fluid from a sealed container". * Fluid type specified in 49 CFR 571.116 | X | |
| Measure letter height | 3.2 mm | Letters shall be at least 3.2 mm/ 0.125" high | X | |
| Describe label attachment method and location. <u>Embossed on top of the master cylinder reservoir filler cap.</u> | | Lettering shall be permanently affixed, engraved or embossed and located so as to be visible by direct view either on or within 100 mm/3.94 inches of the brake fluid reservoir filler plug or cap. | X | |
| Does the lettering contrast with the background? | Yes | If label is not engraved or embossed, letters shall be of a color that contrasts with the background | NA | |
| | <u>No</u> | | | |

Comments: None.

Technician: Jerry Inman

DATA SHEET 30 (Part 4 of 5)
TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2009 Toyota Venza;

NHTSA NO.: C95108;

DATE: 04/29/09

BRAKE SYSTEM WARNING INDICATOR (S5.5)

| CONDITION | ANSWER | REQUIREMENTS | PASS | FAIL |
|--|-----------------|---|------|------|
| Brake Systems Indicator Lamp Function Check (S5.5.2) (Bulb and systems check) | | | | |
| Describe location of brake indicator lamp: <u>Upper right quadrant of the instrument cluster.</u> | NA | Shall be in front, and in clear view, of driver. | X | |
| Does lamp light with ignition (start) switch at ON/RUN? | Yes | Automatic activation when ignition switch is "on" when engine not running , or ignition between "on" and "start" if is manufacturer check position- OR -single manual action by driver | X | |
| Does lamp light with ignition between ON and Start? | Yes | | | |
| Brake check description in owner's manual? | Yes | Manufacturer shall explain the brake check function test procedure in the owner's manual. | X | |
| Brake System Warning Indicator ACTIVATION (S5.5.1) DURATION (S5.5.3) FUNCTION (S5.5.4) | | | | |
| CONDITION | Light ON? | REQUIREMENT | PASS | FAIL |
| A. In event of hydraulic leak (1) On or before appearance of pressure differential of 218 psi (split system) | NA | When ignition (Start) switch is ON , lamp must light whenever (A), (B), (C), or (D) occurs. In addition, if service brake system is not a split system, audible warning must be activated when any condition in (A) exists. Visual warning indicator for non-split systems must be flashing. | X | |
| (2) If any reservoir falls below either "safe" level or 25% of capacity, whichever is greater. Values: 150 ml or cc (above "min" mark). | Yes | | | |
| (3) On or before supply pressure to brake power unit falls to 50% | NA | | | |
| B. Electrical functional failure in an antilock or variable brake proportioning system. | Yes | | X | |
| C. Application of the parking brake. | Yes | | | |
| D. Brake lining wear-out if optical warning. | NA | | | |
| E. <i>For a vehicle with <u>electrically-actuated service brakes</u>, failure of the source of electric power to the brakes or diminution of state of charge of the batteries.</i> | NA | | | |
| F. <i>For a vehicle with <u>electric transmission</u> of the <u>service brake control signal</u>, failure to a brake control circuit.</i> | NA | | | |
| G. <i>For an EV with RBS that is part of the service brake system failure of RBS.</i> | NA | | | |
| <u>Must have Audible alarm</u> if <u>not split system</u> and a condition in (a) above exists? | NA | | | |
| If condition (A) (2) above does not exist, then fluid reservoir must be transparent for fluid check without the need for reservoir to be opened? (S5.4.4) | NA | | | |
| Indicator lamps remain activated as long as condition exists - ignition "on", and engine on or off? _____ (S5.5.3 DURATION)) | Yes | | | |
| Visual warning – continuous or flashing? Audible warning –continuous or flashing? | Yes-Cont. NA | | | |

Comments: None.

Technician: Jerry Inman

DATA SHEET 30 (Part 5 of 5)
TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2009 Toyota Venza; NHTSA NO.: C95108; DATE: 04/29/09

BRAKE SYSTEM WARNING INDICATOR LABELING (S5.5.5)

| CONDITION AND REQUIREMENT | ANSWER NOTE: Standard requires that the answer to questions be YES | PASS | FAIL |
|--|---|------|------|
| Are visual indicators legible to driver in daylight and nighttime conditions when activated? | Yes | X | |
| Are visual indicator words 3.2 mm (.125") high minimum? Record Height: "Brake" – <u>3.2 mm</u> ; "ABS" – <u>3.2 mm</u> . | Yes | X | |
| Visual indicator words and background contrasting colors, one of which is red. Record colors <u>Letters – Red, Lens – Black</u> | Yes | X | |
| If split system, is there one brake indicator? If yes, does it say the word "Brake"? | Yes | X | |
| If not split system; is there a separate indicator for loss of fluid or fluid pressure? Does this indicator say "Stop-Brake Failure"? Are the letters block and not less than 6.4 mm (.25") in height? Record letter height _____ | NA | | |
| If separate indicator for: 1. Low brake fluid per S5.5.1(a)(1), does indicator say "Brake Fluid"? NOTE: not required for mineral oil system Record wording: _____ 2. Gross pressure loss per S5.5.1(a)(2), does indicator say "Brake Pressure"? Record wording: _____ 3. Electrical functional failure in antilock or variable proportioning system per S5.5.1(b), letters and background contrasting colors one of which is yellow? Record colors <u>Lens – Black, Letters – Yellow</u> . Does indicator say "Antilock" or "ABS" or "Brake Proportioning"? Record wording: <u>"ABS"</u> . 4. Parking brake per S5.5.1(c), does indicator say "Park" or "Parking Brake"? Record wording: _____ 5. Brake lining wear-out per S5.5.1(d), does indicator say "Brake Wear"? Record wording - _____ 6. If separate indicator for RBS, the letters and background shall be of contrasting colors, one of which is yellow. The indicator shall be labeled "RBS". RBS failure in a system which is part of the service brake system may also be indicated by a yellow lamp that also indicates "ABS" failure and displays the symbol "ABS/RBS." Record wording: _____ 7. For any other function? If yes, _____ Record <u>NA</u> | NA NA Yes Yes NA NA NA | X | |

DATA INDICATES COMPLIANCE: YES X NO _____

Comments: None.

Technician: Jerry Inman

DATA SHEET 31 (Part 1 of 2)

CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS

VEHICLE: 2009 Toyota Venza;

NHTSA NO.: C95108;

DATE: 04/29/09

| BRAKE | | LINING | | |
|---|------------------------|---|--------------------|---------------------------------|
| LOCATION | TYPE | DESCRIPTION | MINIMUM THICKNESS | THICKNESS TO FULLY WORN (1) mm* |
| Left Front | Drum | Leading | Pre-test 11.86 mm | 7 |
| | | Primary | Post Test 10.86 mm | |
| | | Inboard X | Δ 0.98 mm | |
| | Disc X | Trailing | Pre-test 11.96 mm | 7 |
| | | Secondary | Post Test 11.30 mm | |
| | | Outboard X | Δ 0.66 mm | |
| LINING CLEARANCE: | Diametrical (2): N/A | Inboard: 0 mm. | Outboard: 0 mm. | |
| WHEEL CYLINDER DIAMETER (3): N/A | | CALIPER PISTON DIAMETER (3): 45.91 mm (x2 pistons). | | |
| SHOE CAGE DIAMETER (4) <u>N/A</u> ; CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C. <u>N/A</u> | | | | |
| Right Rear | Drum | Leading | Pre-test 10.01 mm | 7 |
| | | Primary | Post Test 9.84 mm | |
| | | Inboard X | Δ 0.17 mm | |
| | Disc X | Trailing | Pre-test 10.07 mm | 7 |
| | | Secondary | Post Test 9.81 mm | |
| | | Outboard X | Δ 0.26 mm | |
| LINING CLEARANCE: | Diametrical (2) N/A mm | Inboard – 0 mm | Outboard – 0 mm | |
| WHEEL CYLINDER DIAMETER (3): N/A | | CALIPER PISTON DIAMETER (3): 44.06 mm (x1 piston). | | |
| SHOE CAGE DIAMETER (4): N/A | | CENTER POINT OF BRAKE ASSY TO CENTER PT. OF W.C.: N/A | | |
| CIRCUIT #1 CONSISTS OF: | LF - X | LR | RF | RR - X |
| CIRCUIT #2 CONSISTS OF: | LF | LR - X | RF - X | RR |
| (1) MFRS. RECOMMENDATIONS – FRONT & REAR: 7 mm. | | | | |
| (2) REAR – 0 mm. FRONT – 0 mm. | | | | |
| (2) DRUM BRAKES, MEASURED AT HORIZONTAL CENTERLINE: NA. | | | | |
| (3) MFRS. DATA: FRONT – 46 mm, 2 pistons; REAR – 44 mm, 1 piston. | | | | |
| (4) RESET POSITION: NA. | | | | |

Comments: Manufacturer's new total lining thickness: Front – 12 mm, Rear – 10 mm.

Technician: Jerry Inman

DATA SHEET 31 – SECTION CONTINUED (Part 2 of 2)Vehicle: 2009 Toyota Venza;NHTSA No.: C95108;Date: 05/12/09**Procedure and Example for Determining Master Cylinder Volume Requirement**

The procedure followed for determining the minimum volume requirements is outlined in the example shown below. The required data is taken from the previous page, both measured and manufacturer's data.

DISC BRAKES

Volume Required, $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times [\pi (D^2)]/4$, where –

- V_r = Volume required per wheel
- Δt = Change in thickness (average)
- i = Inboard
- o = Outboard
- D = Caliper cylinder diameter
- c = Average clearance

Using the above equations, the volume requirements for Subsystem No. 1 (LF/RR) and Subsystem No. 2 (RF/ LR) were calculated utilizing measured and manufacturer's provided data to create the greatest displacement, as shown below:

Disc Brake:
(Front)

$$V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi D^2}{4}$$

$$\Delta t_i = 5 \text{ mm}$$

$$\Delta t_o = 5 \text{ mm}$$

$$t_{ic} + t_{oc} = 0 \text{ mm}$$

$$D = 46 \text{ mm}$$

$$V_r = (5.0 + 0 + 5.0 + 0) \frac{\pi (46)^2}{4}$$

$$= 10 (1661.9)$$

$$= 16619.0 \text{ mm}^3 = 16.6 \text{ ml (x2 Pistons)} = 33.2 \text{ ml}$$

Disc Brake:
(Rear)

$$V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi D^2}{4}$$

$$\Delta t_i = 3 \text{ mm}$$

$$\Delta t_o = 3 \text{ mm}$$

$$t_{ic} + t_{oc} = 0 \text{ mm}$$

$$D = 44 \text{ mm}$$

$$V_r = (3.0 + 0 + 3.0 + 0) \frac{\pi (44)^2}{4}$$

$$= 6 (1520.5)$$

$$= 9123.2 \text{ mm}^3 = 9.1 \text{ ml (x1 Piston)} = 9.1 \text{ ml}$$

For System 1 (LF & RR)

$$V_{r1} = 16619.0 \text{ mm}^3 + 9123.2 \text{ mm}^3 = 67928.4 \text{ mm}^3$$

$$V_{r1} = 25742.2 \text{ mm}^3 = (25.7 \text{ ml})$$

For System 2 (RF & LR)

$$V_{r2} = V_{r1}$$

$$V_{r2} = 25742.2 \text{ mm}^3 = (25.7 \text{ ml})$$

$$\text{TOTAL VOLUME REQUIRED} = V_t = V_{r1} + V_{r2} = 25.7 + 25.7 = 51.4 \text{ ml}^*$$

Section 6.0

Photographs

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009



2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

35



Right Rear 3/4 View

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

02/09

MFD. BY: TOYOTA MOTOR MANUFACTURING, KENTUCKY, INC.
GVWR: 2310KG (5095LB)

GAWR: FRT. 1400 KG (3090LB) WITH P245/50R20 TIRES
20X7.5J RIMS, AT 220KPA (32PSI) COLD.
RR. 1270 KG (2800LB) WITH P245/50R20 TIRES
20X7.5J RIMS, AT 220KPA (32PSI) COLD.

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR
VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE SHOWN ABOVE.

4T3ZK11A89U007432 MPV



C/TR: 8U6/FA01

GGV10L-AWTGKA

A/TM: -02A/U660E

MADE IN U.S.A. 85890

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009



TIRE AND LOADING INFORMATION RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

| | | | |
|------------------|-----------------|-----------------|-------------------|
| SEATING CAPACITY | TOTAL | FRONT | REAR |
| NOMBRE DE SIÈGES | TOTAL: 5 | AVANT: 2 | ARRIÈRE: 3 |

The combined weight of occupants and cargo should never exceed 370 kg or 825 lbs.
Le poids total des occupants et des chargement ne doit jamais dépasser 370 kg ou 825 lb.

| TIRE PNEU | SIZE DIMENSIONS | COLD TIRE PRESSURE PRESSION DES PNEUS À FROID |
|----------------------|--------------------|---|
| FRONT AVANT | P245/50R20 | 220kPa, 32 PSI |
| REAR ARRIÈRE | P245/50R20 | 220kPa, 32 PSI |
| SPARE DE RECHANGE | T165/90D18 | 420kPa, 60 PSI |

**SEE OWNER'S MANUAL
FOR ADDITIONAL
INFORMATION**

**VOIR LE MANUEL
DE L'USAGER
POUR PLUS DE
RENSEIGNEMENTS**

V2

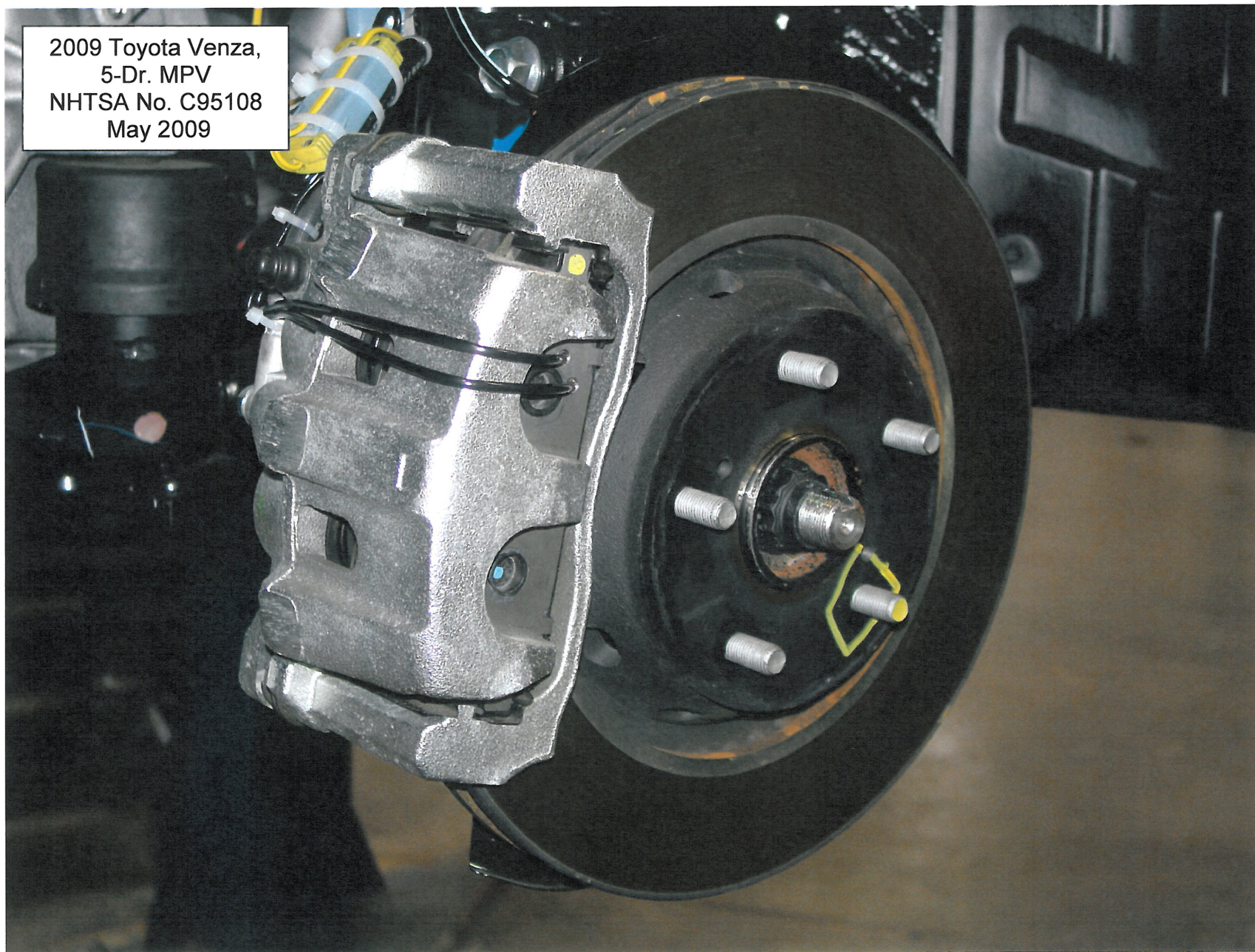
42661-0T010

**CAUTION
ATTENTION**



2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

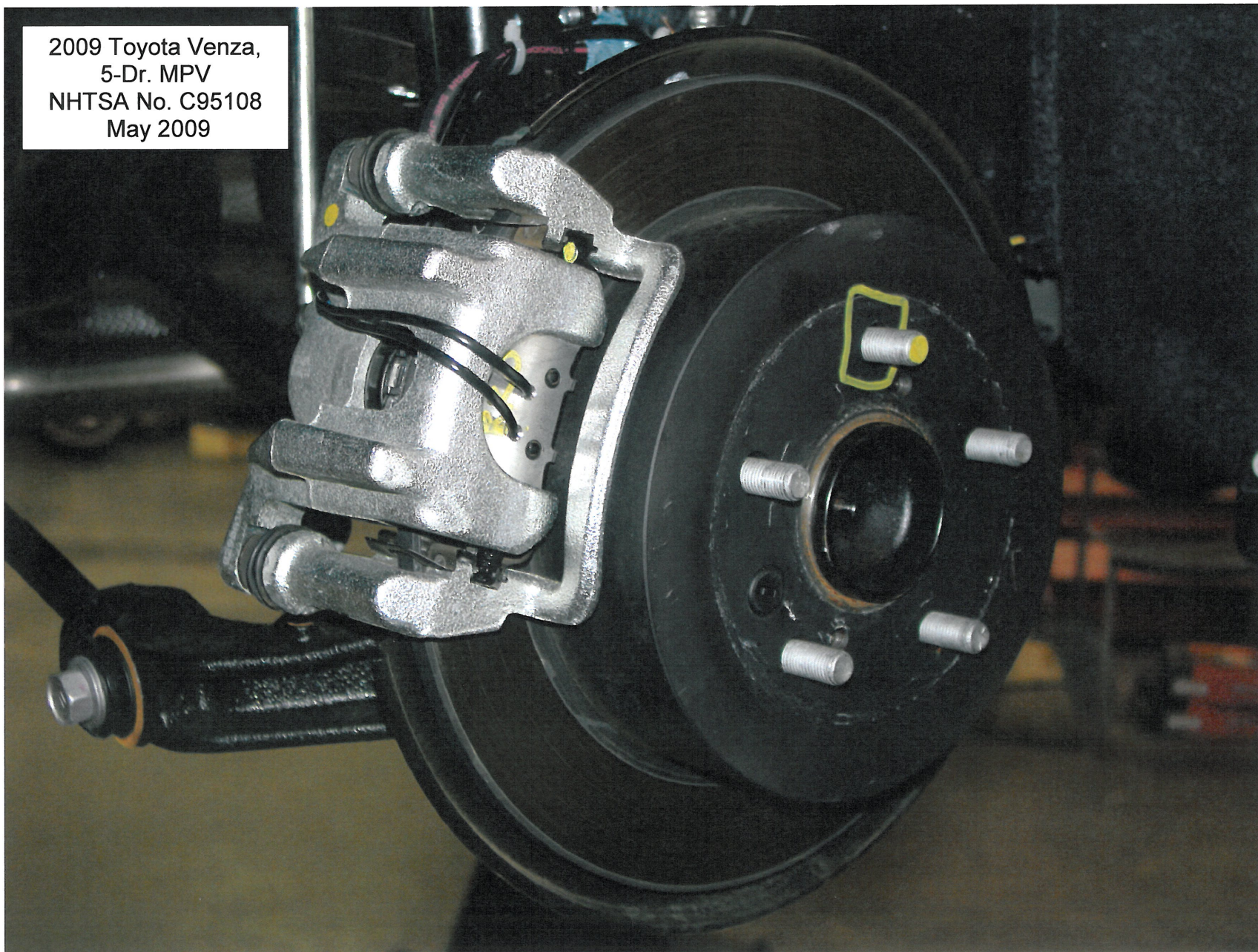
38



Left Front Thermocouple Installation

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

39



Right Rear Thermocouple Installation

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

40



Test Instrumentation in Vehicle

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009



Test Instrumentation in Vehicle

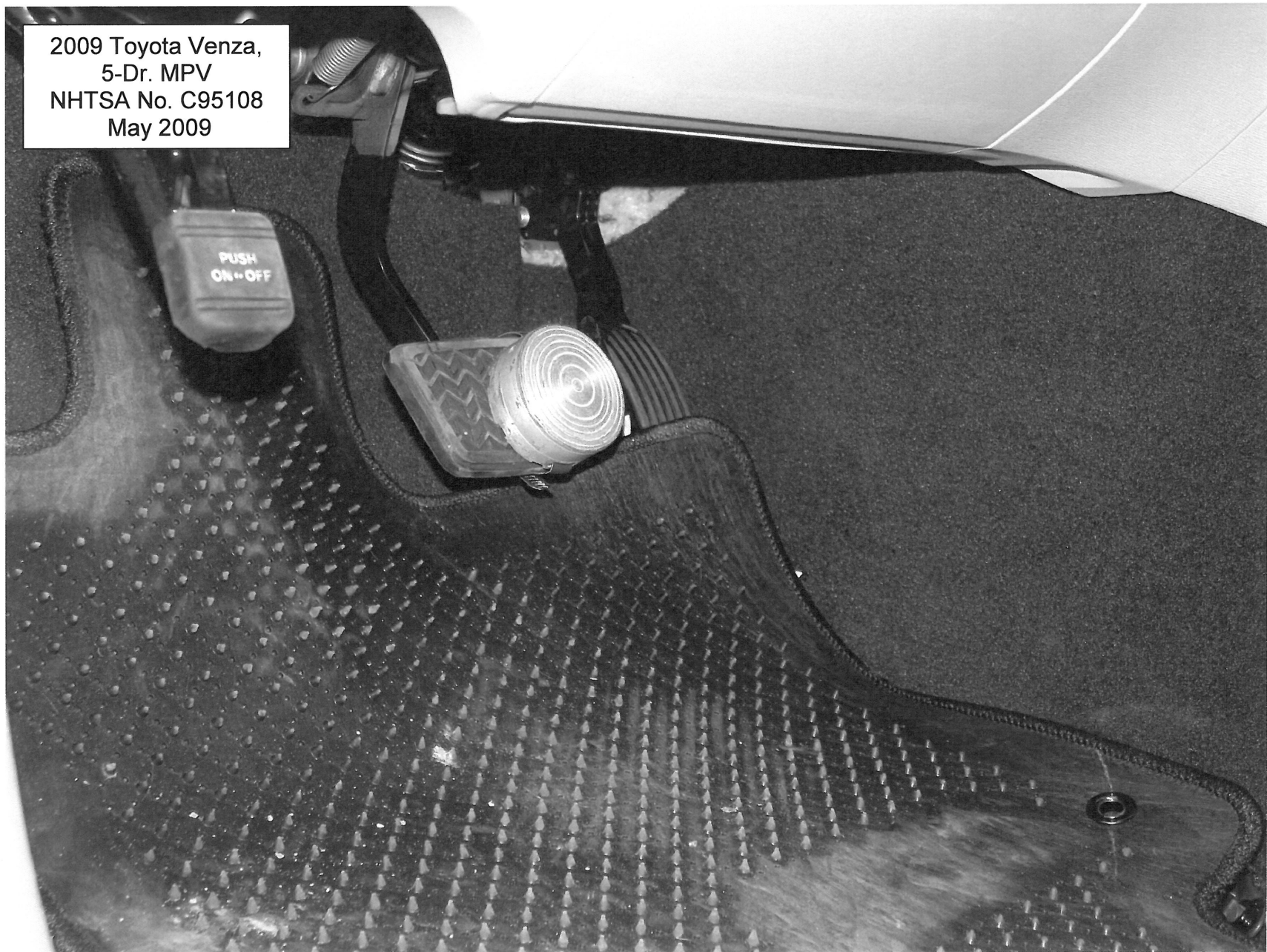
2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

42

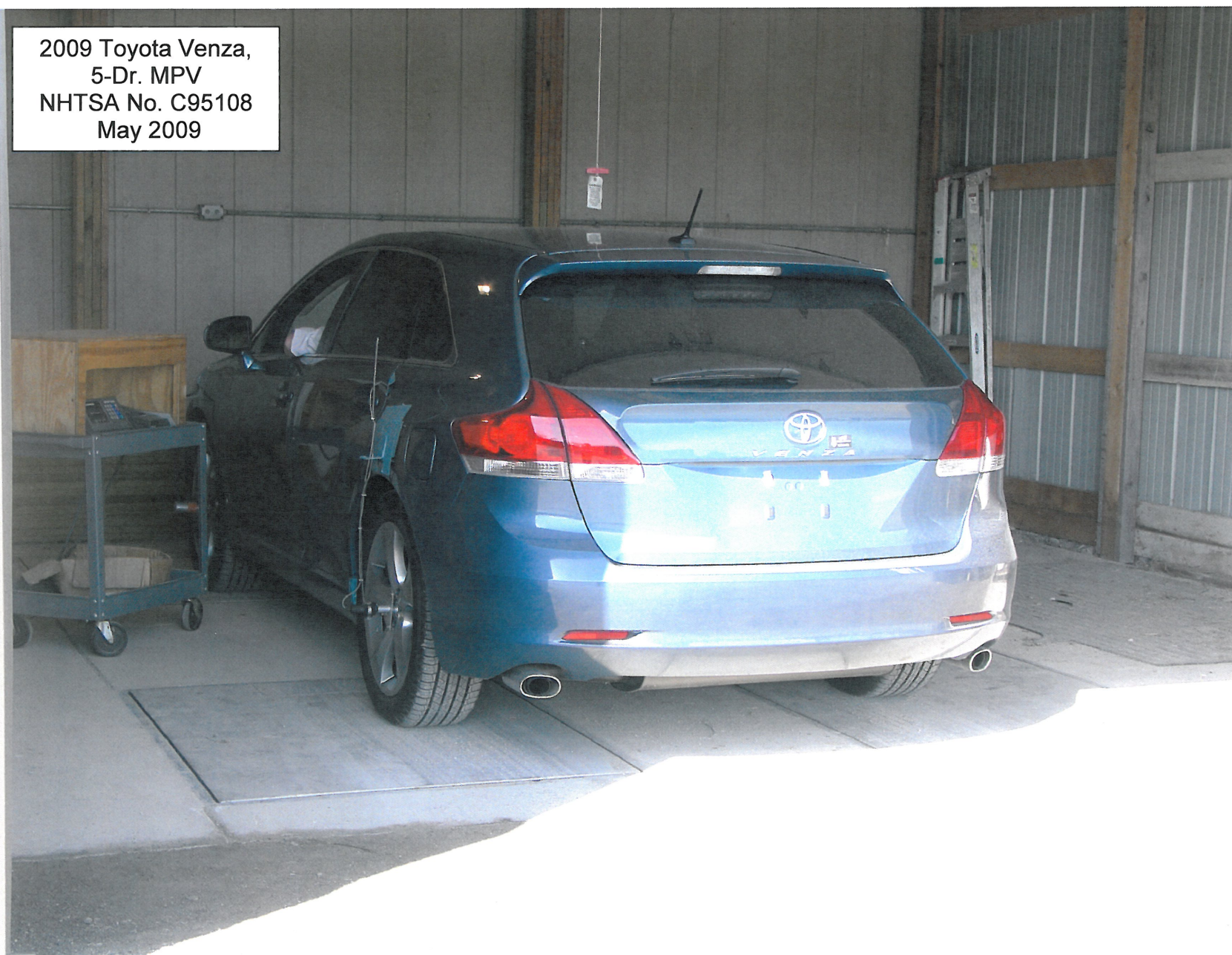


Test Instrumentation in Vehicle

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

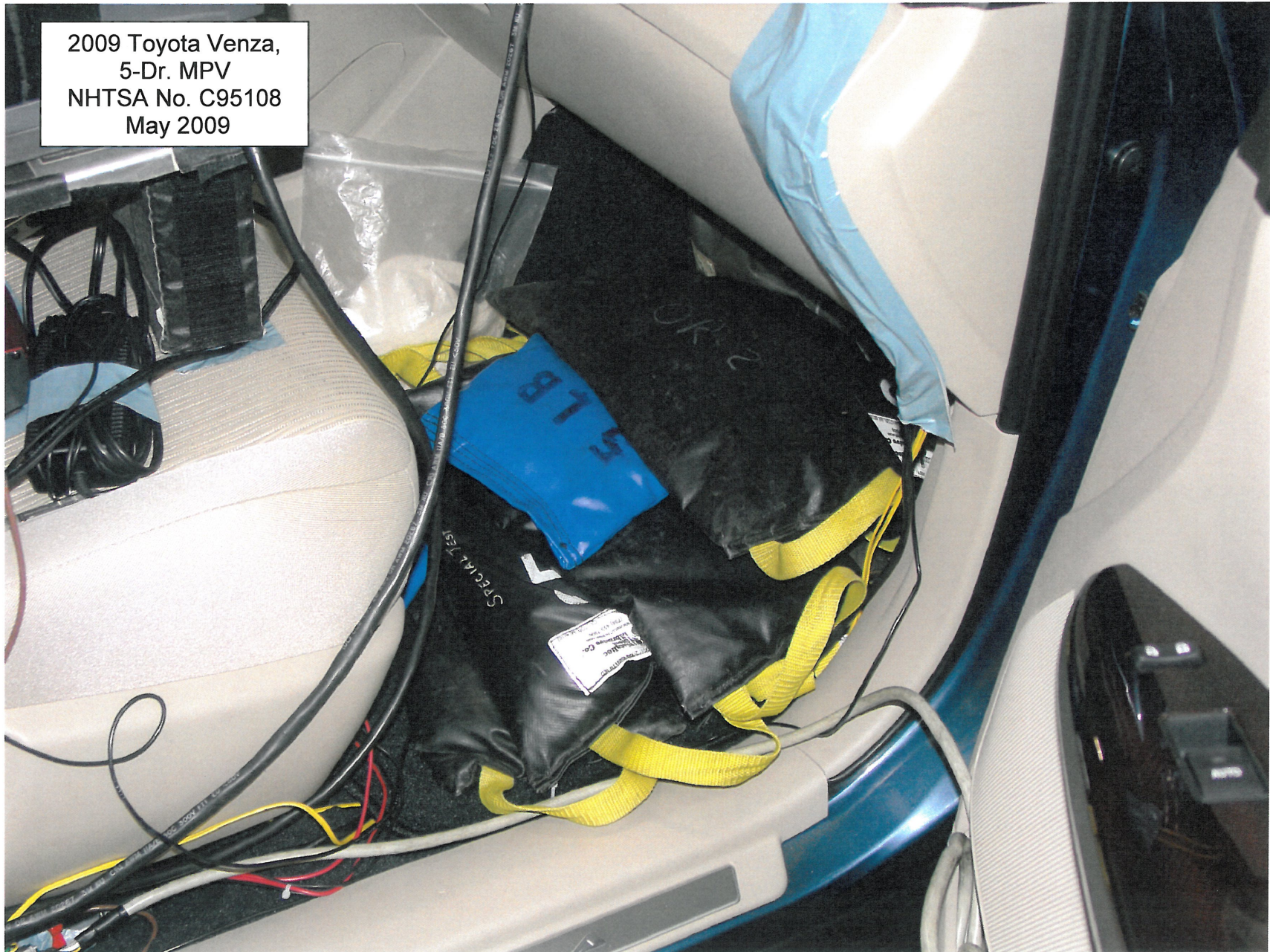


2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009



Vehicle Being Weighed

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009



Ballast in Vehicle

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

46



Ballast in Vehicle

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

47



Ballast in Vehicle

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

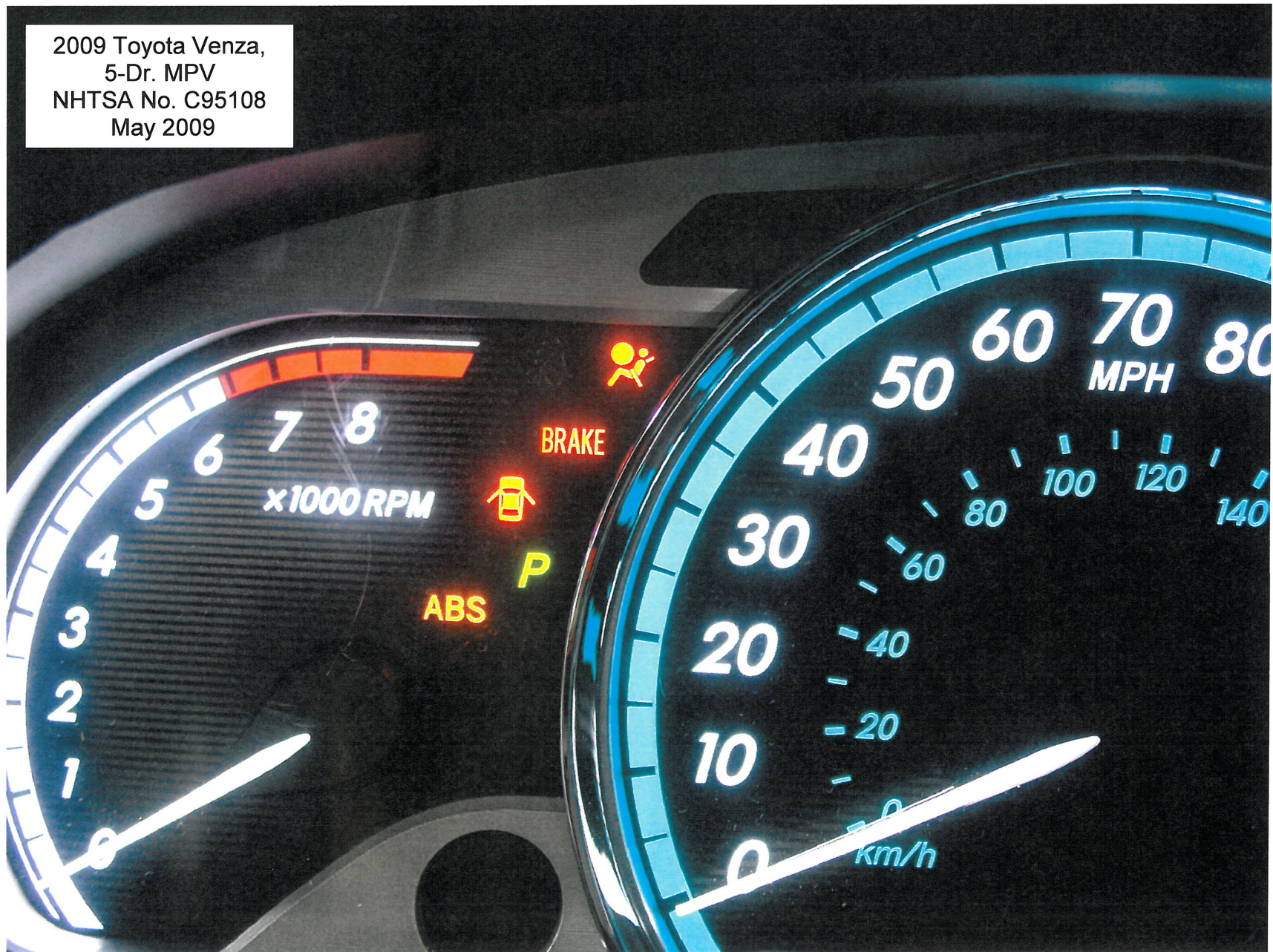
48



Ballast in Vehicle

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

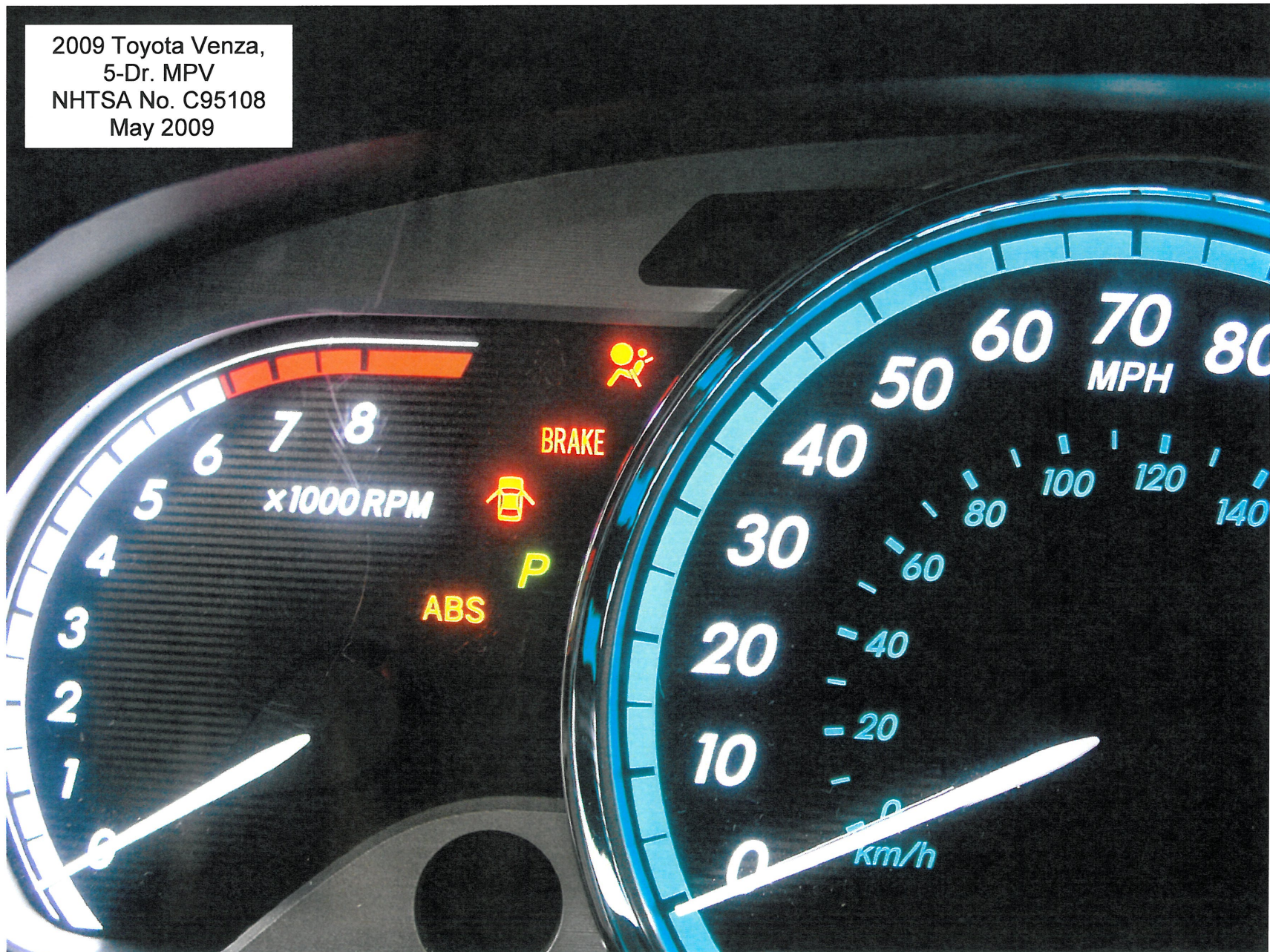
49



Brake System and ABS Indicator (Warning) Lamps

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009

49



Brake System and ABS Indicator (Warning) Lamps

2009 Toyota Venza,
5-Dr. MPV
NHTSA No. C95108
May 2009



Brake System (Master Cylinder) Reservoir Warning Label

7.0 INSTRUMENT CALIBRATION (12 MONTH MAXIMUM INTERVAL)

VEHICLE: 2009 Toyota Venza; NHTSA NO.: C95108; DATE: 04/15/09

| INSTRUMENT | SERIAL NUMBER | CALIBRATION DATE | NEXT CALIBRATION |
|---|--------------------|------------------|------------------|
| Data Acquisition System - Link DAS 2060 | 955009 | 11/10/08 | 11/10/09 |
| Computer – Toshiba/Link Engrg. | TRC-43366 | Not Applicable | Not Applicable |
| Software - Link Engrg. Rev Data | TRC Propr. | NA | NA |
| LF Torque Wheel | Not Utilized | | |
| RF Torque Wheel | Not Utilized | | |
| LR Torque Wheel | Not Utilized | | |
| RR Torque Wheel | Not Utilized | | |
| Stopwatch – Fisher Scientific (Heating Snubs) | SN-97216633 | 08/27/08 | 08/27/09 |
| Stopwatch – Accusplit (Daily Cals) | SW-ST03 | 08/27/08 | 08/27/09 |
| Tire Pressure Gauge – WIKA | AG-101 97216633 | 02/05/09 | 05/06/09 |
| Pedal Force Transducer – Sensor Devel. | 169755 | Each Test | Each Test |
| Asst. Pipe-Handle Steel Weights - Ohaus | LB-0001 | 06/04/08 | 06/04/09 |
| Park Brake Force Transducer – Lebow | LC-42631 | Each Test | Each Test |
| LF Hydraulic Pressure Transducer | Not Utilized | | |
| RF Hydraulic Pressure Transducer | Not Utilized | | |
| LR Hydraulic Pressure Transducer | Not Utilized | | |
| RR Hydraulic Pressure Transducer | Not Utilized | | |
| Accelerometer - Setra (+ or – 15 g) 141A | A-118555 | Each Test | Each Test |
| Fifth Wheel – ADAT DSR6/1aa Radar | 1400082 | Each Test | Each Test |
| Wind Velocity/Direct. – Davis Model 6410 | 050608N22 | 07/13/08 | 07/13/09 |
| Ambient Temp. Gage–Davis Mod. 6150 | 050608N02 | 07/13/08 | 07/13/09 |
| LF Brake Thermocouple - Temprel/Link | T52-0B-24K | Ea. Test w/Link | Ea. Test w/Link |
| RF Brake Thermocouple - Temprel/Link | T52-0B-24K | Ea. Test w/Link | Ea. Test w/Link |
| LR Brake Thermocouple - Temprel/Link | T52-0B-24K | Ea. Test w/Link | Ea. Test w/Link |
| RR Brake Thermocouple - Temprel/Link | T52-0B-24K | Ea. Test w/Link | Ea. Test w/Link |
| Lock-up Detection System | TRC Propr. | Each Test | Each Test |
| Vehicle Weight – Toledo/Mettler Scales JAGXTREME 3000000, (Bldg. 70) | SN 5225831- 5JC | 02/18/09 | 05/18/09 |

QUALITY ASSURANCE _____

DAILY CALIBRATIONS (1 of 3)

Vehicle: 2009 Toyota Venza

NHTSA No.: C95108

Deceleration Calibration Data for Unit 9360

Desired full scale value is: 9.81 m/s/s

Allowed deviation is: + or - 0.15 m/s/s

Accelerometer Level to zero, then tilt to full scale

| "Date" | "Time" | Zero | Cal |
|-----------|----------|---------|---------|
| "stp" | "stp" | "Decel" | "Decel" |
| 4/13/2009 | 11:08:13 | 0.02 | 9.80 |
| 4/15/2009 | 8:02:32 | 0.09 | 10.03 |
| 4/16/2009 | 8:17:30 | 0.05 | 9.88 |
| 4/16/2009 | 15:31:58 | -0.06 | 9.86 |
| 4/17/2009 | 8:07:28 | 0.03 | 9.80 |
| 4/17/2009 | 13:55:11 | 0.01 | 9.80 |
| 4/22/2009 | 10:06:57 | 0.04 | 9.81 |
| 4/22/2009 | 15:35:25 | 0.02 | 9.77 |
| 4/23/2009 | 8:20:30 | 0.02 | 9.77 |
| 4/23/2009 | 15:29:09 | 0.01 | 9.77 |
| 4/24/2009 | 8:54:27 | 0.03 | 9.72 |
| 4/27/2009 | 11:56:38 | -0.01 | 9.80 |

PRE TEST CAL

POST TEST CAL

Pre-Test Linearity Check 04/13/2009

| Actual (m/s/s) | Rec. (m/s/s) |
|----------------|--------------|
| 0.0 | 0.0 |
| 3.0 | 3.0 |
| 6.1 | 6.1 |
| 9.8 | 9.8 |

Post-Test Linearity Check 04/27/2009

| Actual (m/s/s) | Rec. (m/s/s) |
|----------------|--------------|
| 0.0 | 0.0 |
| 3.0 | 3.0 |
| 6.1 | 6.1 |
| 9.8 | 9.8 |

Distance Calibration Data for Unit 9360

Desired full scale value is: 1000 m

Allowed deviation is: 3 m

Light beam Drive from 0 to 100 to 0 km/h
distance sensor on a measured kilometer

| "Date" | "Time" | Distance for |
|-----------|----------|--------------|
| "stp" | "stp" | 1000 meters |
| 4/15/2009 | 8:43:10 | 1000.2 |
| 4/16/2009 | 8:19:59 | 999.9 |
| 4/16/2009 | 15:33:41 | 1004.4 |
| 4/16/2009 | 15:41:21 | 1000.1 |
| 4/17/2009 | 8:12:59 | 1000.5 |
| 4/17/2009 | 13:57:31 | 1000.3 |
| 4/22/2009 | 10:34:38 | 1000.6 |
| 4/22/2009 | 15:44:39 | 1000.1 |
| 4/23/2009 | 8:32:28 | 1000.2 |
| 4/23/2009 | 15:31:37 | 1002.0 |
| 4/24/2009 | 8:57:55 | 1001.6 |
| 4/27/2009 | 11:45:01 | 1000.5 |

POST TEST CAL

DAILY CALIBRATIONS CONTINUED (2 of 3)

Vehicle: 2009 Toyota Venza

NHTSA No.: C95108

Wheel Tachometer Calibrations for Unit 9360

Wheel tachometer calibrations: all wheel speeds should be 15 km/h

| Wheel Lock Detector | While at a standstill, check zeros. Drive vehicle at approx. 15 km/h and engage zero speed switch for each wheel | "Date" | "Time" | Zero | @15km/h | Zero | @15km/h | Zero | @15km/h | Zero | @15km/h | |
|------------------------|---|-----------|----------|------|---------|------|---------|------|---------|------|---------|----------------|
| | | stp | stp | LF | LF | RF | RF | LR | LR | RR | RR | |
| | | 4/22/2009 | 10:17:35 | -0.1 | 17.4 | -0.1 | 16.6 | -0.1 | 29.4 | -0.1 | 15.9 | PRE TEST CALS |
| | | 4/22/2009 | 15:39:31 | -0.1 | 20.2 | -0.1 | 18.6 | -0.1 | 17.4 | -0.1 | 0.1 | |
| | | 4/23/2009 | 8:23:28 | -0.1 | 16.5 | -0.1 | 15.1 | -0.1 | 15.3 | -0.1 | 14.9 | |
| | | 4/23/2009 | 15:23:32 | -0.1 | 13.9 | -0.1 | 15.4 | -0.1 | 15.4 | -0.1 | 15.0 | |
| | | 4/24/2009 | 8:56:19 | -0.1 | 14.4 | -0.1 | 15.8 | -0.1 | 15.1 | -0.1 | 14.8 | |
| | | 4/27/2009 | 11:47:33 | -0.1 | 18.4 | 0.0 | 17.3 | -0.1 | 16.3 | -0.1 | 15.8 | POST TEST CALS |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

When driven over 15 km/hr and the wheel tack generators are shunted to zero volts, does the graphical screen indicate wheel lock at each wheel position? X Yes No.

Pedal Force Meter Calibration for Unit 9360

Target shunt calibration is 798 N

Desired recorded value is: 798 N

Desired recorded actual force calibration check value is: 500 N

Allowed deviation is: 6.5 N

| Service brk. pedal effort | Driver engages a fixed shunt cal switch. | "Date" | "Time" | Zero | Cal Val | |
|------------------------------|---|-----------|----------|-------|----------|----------------|
| | | stp | stp | Force | Force lb | |
| | | 4/13/2009 | 10:35:07 | -2.1 | 799.8 | PRE TEST CAL |
| | | 4/15/2009 | 7:58:37 | -1.8 | 799.4 | |
| | | 4/16/2009 | 8:14:21 | -2.1 | 800.1 | |
| | | 4/16/2009 | 15:29:53 | -2.7 | 799.4 | |
| | | 4/17/2009 | 8:04:46 | -1.3 | 800.2 | |
| | | 4/17/2009 | 13:53:41 | -2.4 | 799.2 | |
| | | 4/22/2009 | 10:04:48 | -2.4 | 800.0 | |
| | | 4/22/2009 | 15:36:39 | -2.0 | 799.9 | |
| | | 4/23/2009 | 8:19:00 | -1.9 | 799.7 | |
| | | 4/23/2009 | 15:27:23 | -2.1 | 800.1 | |
| | | 4/24/2009 | 8:52:39 | -1.7 | 799.9 | |
| | | 4/27/2009 | 12:06:22 | -3.2 | 799.7 | POST TEST CAL. |

Pre-Test Linearity Check - 04/13/09

| Actual | Recorded |
|-----------|-----------|
| Force (N) | Force (N) |
| 0 | 0 |
| 222 | 223 |
| 445 | 445 |
| 498 | 498 |

Post-Test Linearity Check - 04/27/09

| Actual | Recrdd |
|-----------|--------|
| Force (N) | Frc(N) |
| 0 | 0 |
| 222 | 223 |
| 445 | 446 |
| 498 | 499 |

Parking Brake Transducer Cal: Shunt Cal - 942 N, Unit 9360 - 04/24/09

Pre-Test

| Actual | Recorded |
|-----------|-----------|
| Force (N) | Force (N) |
| 0 | 0 |
| 222 | 222 |
| 445 | 445 |
| 498 | 498 |

Post-Test

| Actual | Recrdd |
|-----------|--------|
| Force (N) | Frc(N) |
| 0 | 0 |
| 222 | 222 |
| 445 | 445 |
| 498 | 498 |

DAILY CALIBRATIONS CONTINUED (3 of 3)

Vehicle: 2009 Toyota Venza

NHTSA No.: C95108

Dynamic Speed Calibration for Unit 9360

Desired speed value is: 100 km/h

Allowed deviation is: 1.6 km/h

Desired time value is: 36 seconds

Allowed deviation is: + or - 0.6 seconds

Light beam Drive vehicle
speed sensor at a steady
100 km/h
through a
kilometer.

| "Date" | "Time" | "Speed" | Time" |
|-----------|----------|---------|-------|
| stp | stp | km/h | sec |
| 4/15/2009 | 8:52:00 | 100.2 | 35.85 |
| 4/16/2009 | 8:23:50 | 99.6 | 36.28 |
| 4/16/2009 | 15:45:00 | 100.2 | 36.34 |
| 4/17/2009 | 8:16:40 | 100.6 | 36.40 |
| 4/17/2009 | 14:01:10 | 100.1 | 36.40 |
| 4/22/2009 | 10:38:15 | 99.5 | 36.26 |
| 4/22/2009 | 15:41:51 | 101.0 | 35.94 |
| 4/23/2009 | 8:36:10 | 99.9 | 35.91 |
| 4/23/2009 | 15:34:55 | 100.4 | 36.09 |
| 4/24/2009 | 9:01:34 | 100.4 | 36.12 |
| 4/27/2009 | 11:42:35 | 100.3 | 35.97 |

APPENDIX A

Copy of Manufacturer's Sticker



moving forward

DESC.: **VENZA** **V6 5-DR SDN FWD**

VIN: **4T3ZK11A89U007432**

YR/MDL: 2009/2812A

CLR: **TROPICAL SEA MET/IVORY** (08U8/01)

PORT/PLANT: **Georgetown, KY/TMMK** RAILHEAD:

GOVERNMENT SAFETY RATINGS

Frontal Driver ★★★★★
Crash Passenger ★★★★★

Star ratings based on the risk of injury in a frontal impact.
Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

Side Front seat ★★★★★
Crash Rear seat ★★★★★

Star ratings based on the risk of injury in a side impact.

Rollover ★★★★★

Star ratings based on the risk of rollover in a single vehicle crash.

Star ratings from 1 to 5 stars (★★★★★) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA).

www.safercar.gov or 1-888-327-4236

STANDARD EQUIPMENT

MECHANICAL AND PERFORMANCE

- 3.5L V6 DOHC 24V w/ Dual VVT-i
- 8-Spd Auto ECT-i w/ Sequential Shift
- 20" Alloy Wheels w/P245/50R20 Tires
- Electronic Power Steering (EPS)
- 4-Wheel Disc Brakes / 4-Wheel Ind Suspension

SAFETY

- Star Safety System Includes:
 - Vehicle Stability Control w/ TRAC
 - Anti-Lock Brakes w/EBD & Brake Assist
 - Dr & Fr Pass Advanced Front Airbags
 - Dr & Fr Pass Seat Mounted Side Airbags
 - Side Curtain Airbags & Dr Knee Airbag
 - Dr and Front Passenger Active Headrests
 - 3-Point Seatbelts w/ ALN/ELR Pass Belts
 - LATCH (Lwr Anchor & Tethers for Children) for Outboard Rear Seating Positions Only
 - Direct Tire Pressure Monitor System

EXTERIOR

- Rear Spoiler w/ Integrated LED Stop Lamp
- Projector Lens Halogen Headlamps
- Daytime Running Lights with Off Switch
- Integrated Fog Lamps / Dual Exhaust
- Roof Antenna w/ Integrated SAT Antenna
- Front Variable & Rear Intermittent Wiper

COMFORT & CONVENIENCE

- Front Dual Zone Auto Climate Control System w/ Air Filter
- AM/FM 8 CD Changer w/ Integrated SAT, Auxiliary Audio Jack and Six Speakers
- MP3 Player Holder w/ Wire Management
- Reclining Fold-Flat 60/40 Rear Seat w/ Armrest and One-Touch Fold-Flat Function
- 3.5-inch Multi-Information Display
- Power Multi-Adjustable Driver's Seat
- Ctr Console w/ Sliding Cover / Armrest and Dual Illuminated Cup Holders
- Tilt/Telescopic Steering Wheel w/ Controls
- EC Mirror, Compass and Homelink
- Pwr Windows w/ 4 Door Auto Up/Down
- Remote Keyless Entry and Cruise Control
- Privacy Glass and Tonneau Cover
- Ry Personal Reading Lamps and Air Vents
- Full Tank of Gas

MANUFACTURER'S SUGGESTED RETAIL PRICE **\$27,800.00**

OPTIONAL EQUIPMENT

FE 50 State Emissions
CF Floor Mats & Cargo Mat 269.00

EPA Fuel Economy Estimates

These estimates reflect new EPA methods beginning with 2008 models.

CITY MPG

19

Expected range
for most drivers
16 to 22 MPG

Estimated
Annual Fuel Cost
\$2,798

based on 15,000 miles
at \$4.10 per gallon

Combined Fuel Economy
This Vehicle

22

12 32

All SUVs

HIGHWAY MPG

26

Expected range
for most drivers
22 to 30 MPG

Your actual
mileage will vary
depending on how you
drive and maintain
your vehicle.

DELIVERY PROCESSING AND HANDLING FEE 720.00

TOTAL \$28,789.00

The New Vehicle Limited Warranty provides 3-year/50,000 mile basic coverage, 5-year/60,000 mile powertrain coverage, plus 8-year/unlimited mile corrosion perforation coverage. See Warranty and Maintenance Guide for details. An extended service contract may be available for the vehicle. Ask dealer for details. Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, license and title fees, applicable federal, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price.

Dealer Name / Address: 34026
JIM WHITE TOYOTA
6123 WEST CENTRAL AVENUE
TOLEDO OH43615

Ship to:



See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov



APPENDIX B

Discussion on Data

DISCUSSION ON DATA

Symbols for Brake Components

| | | | | | | | | |
|---|---|---------|-----|---|-----------|-----|---|----------------------------|
| 4 | - | 4 Wheel | G | - | Groan | DL | - | Deceleration (State FPSPS) |
| X | - | Skid | SQ | - | Squeal | PF | - | Pedal on Floor |
| L | - | Left | SQK | - | Squeak | SCP | - | Shoe Scrape |
| R | - | Right | PO | - | Pinchout | RB | - | Rubber Banding |
| R | - | Rear | P | - | Pull | O | - | Odor |
| F | - | Front | R | - | Shudder | NOX | - | No Skid |
| B | - | Both | M | - | Momentary | | | |

| | | |
|-------------|---|----------------------|
| INT or INIT | - | Initial Part of Stop |
| MID | - | Middle of Stop |
| END | - | End of Stop |

All stops were made manually.

APPENDIX C

Contractor's Comments
Procedure Modifications
and
Test Facility

Comments for vehicle C95108.

For all recorded decelerations:

The recorded *average* deceleration values for the tests are slightly lower than that which is required or targeted for certain test sections. However, in all cases and in reality, the driver maintained the correct required/target deceleration values for the majority of time for each of those stops. The recorded deceleration is acquired from the moment the service brake pedal is moved until the vehicle reaches zero speed. Therefore, the time needed to achieve the target deceleration (rise time) and the time the vehicle goes from the target deceleration to zero (fall time) is included in the average deceleration calculation. The rise and fall times were added to the entire length of the stops. Hence, the recorded average deceleration values were generally and slightly less than the required/target deceleration values.

For Data Sheet 16 – Antilock Functional Failure at LLVW, the ABS wiring harness/connector was disconnected from the ABS ECM. The “ABS”, “BRAKE”, vehicle stability control/traction control, check engine and electric power steering warning lamps then came on. Additionally, the speedometer and odometer discontinued functioning. After completing the test and re-affixing the ABS wiring harness to the ECM, and starting the engine, the check engine lamp remained on. Therefore, the battery was disconnected and reconnected. This action cleared the engine warning lamp. These same warning lamps came on and the same restoration procedures were performed during testing for Data Sheet 22 – Antilock Functional Failure at GVWR.

The Hydraulic Circuit Failure Tests were not performed to the lab procedure sequence to both save time and cause minimal disruption to the hydraulic brake system. Sequence: Circuit #1 @ LLVW; Circuit #2 @ LLVW: Circuit #2 @ GVWR and Circuit #1 @ GVWR.

For Data Sheets 27 – Hot Performance at GVWR, the driver momentarily exceeded the maximum allowable pedal of 500N by 20N. Given the distance margin in which the vehicle stopped as well as the average deceleration generated, it is believed that, had the driver not exceeded 500N, the vehicle would have stopped in less distance than the stated allowable maximum.

The manufacturer's response provided dimensions for the fully worn lining thickness that appeared to allow a significant of lining remaining on the brake pad. Therefore, per the Standards Engineer, another calculation was performed using the "zero" lining default for the fully worn lining thickness to compare and confirm there was sufficient fluid volume remaining available in the reservoir for this condition.

Procedure and Example for Determining Master Cylinder Volume Requirement

The procedure followed for determining the minimum volume requirements is outlined in the example shown below. The required data is taken from the previous page, both measured and manufacturer's data.

DISC BRAKES

Volume Required, $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times [\pi (D^2)]/4$, where –

V_r = Volume required per wheel

Δt = Change in thickness (average)

i = Inboard

o = Outboard

D = Caliper cylinder diameter

c = Average clearance

Using the above equations, the volume requirements for Subsystem No. 1 (LF/RR) and Subsystem No. 2 (RF/ LR) were calculated utilizing measured and manufacturer's provided data to create the greatest displacement, as shown below:

$$\begin{aligned} \text{Disc Brake:} \quad V_r &= (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi D^2}{4} \\ \text{(Front)} \quad \Delta t_i &= 12 \text{ mm} \\ \Delta t_o &= 12 \text{ mm} \\ t_{ic} + t_{oc} &= 0 \text{ mm} \\ D &= 46 \text{ mm} \\ V_r &= (12.0 + 0 + 12.0 + 0) \frac{\pi (46)^2}{4} \\ &= 24 (1661.9) \\ &= 39885.6 \text{ mm}^3 = 39.9 \text{ ml (x2 Pistons)} = 79.8 \text{ ml} \end{aligned}$$

$$\begin{aligned} \text{Disc Brake:} \quad V_r &= (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi D^2}{4} \\ \text{(Rear)} \quad \Delta t_i &= 10 \text{ mm} \\ \Delta t_o &= 10 \text{ mm} \\ t_{ic} + t_{oc} &= 0 \text{ mm} \\ D &= 44 \text{ mm} \\ V_r &= (10.0 + 0 + 10.0 + 0) \frac{\pi (44)^2}{4} \\ &= 20 (1520.5) \\ &= 30410.0 \text{ mm}^3 = 30.4 \text{ ml (x1 Piston)} = 30.4 \text{ ml} \end{aligned}$$

For System 1 (LF & RR)

$$V_{r1} = 79771.2 \text{ mm}^3 + 30410.0 \text{ mm}^3 = 110181.2 \text{ mm}^3$$

$$V_{r1} = 110181.2 \text{ mm}^3 = (110.2 \text{ ml})$$

For System 2 (RF & LR)

$$V_{r2} = V_{r1}$$

$$V_{r2} = 110181.2 \text{ mm}^3 = (110.2 \text{ ml})$$

$$\text{TOTAL VOLUME REQUIRED} = V_t = V_{r1} + V_{r2} = 110.2 + 110.2 = 220.4 \text{ ml}^*$$

Note: There is 393 ml of total fluid capacity within the master cylinder reservoir.

7.5-MILE TEST TRACK

The 7.5-mile test track encloses a 1,600-acre area, one mile wide and 3.5 miles long.

The track has a downward grade, north to south, of 0.228 percent and a cross slope in the straightaways of 3/16 inch per foot. The 1.88 mile long straightaways flow into transition areas 2,300 feet in length and then into 5,275-foot long curves with a constant radius of 2,400 feet. The 36-foot wide straightaways and the 42-foot wide curves provide three test lanes. Paved berms, 12 feet in width, border the straightaways and the inside of the curves.

As a vehicle moves toward the outside of the track in the curves, it encounters a progressively steeper bank. The inside lane (or "slow" lane) has a bank of 10 degrees allowing a neutral speed of 80 mph with no side forces. In the center lane, the slope increases to 19 degrees resulting in a neutral speed of 110 mph. The outside lane's 28-degree bank allows a 140 mph neutral speed. Rimming the outer lane is a seven-foot safety lane culminating in a 36-degree slope at the guardrail.

The facility is paved with Portland cement concrete. It carries a maximum single axle load of 36,000 pounds and a maximum tandem axle load weight of 48,000 pounds. Special provisions can be made for heavier weight loads.

With 22.5 lane miles, our track will accommodate many vehicles simultaneously. Research which utilizes the track includes component performance and durability studies, brake tests, aerodynamic studies, fuel economy studies, drive line efficiency tests, and the determination of vehicular acceleration and cruise characteristics. In addition, it supports maximum speed determination, road load power, noise and emission measurements and tire durability test programs.

The 7.5-mile test track can be used in conjunction with other facilities at TRC. It provides an excellent area for pre-test conditioning of equipment such as brake burnishing, tire break-in, and vehicle warm-up.

TRC SKID PAD

The Skid Pad is a test facility which is utilized primarily for the evaluation of tire and brake systems.

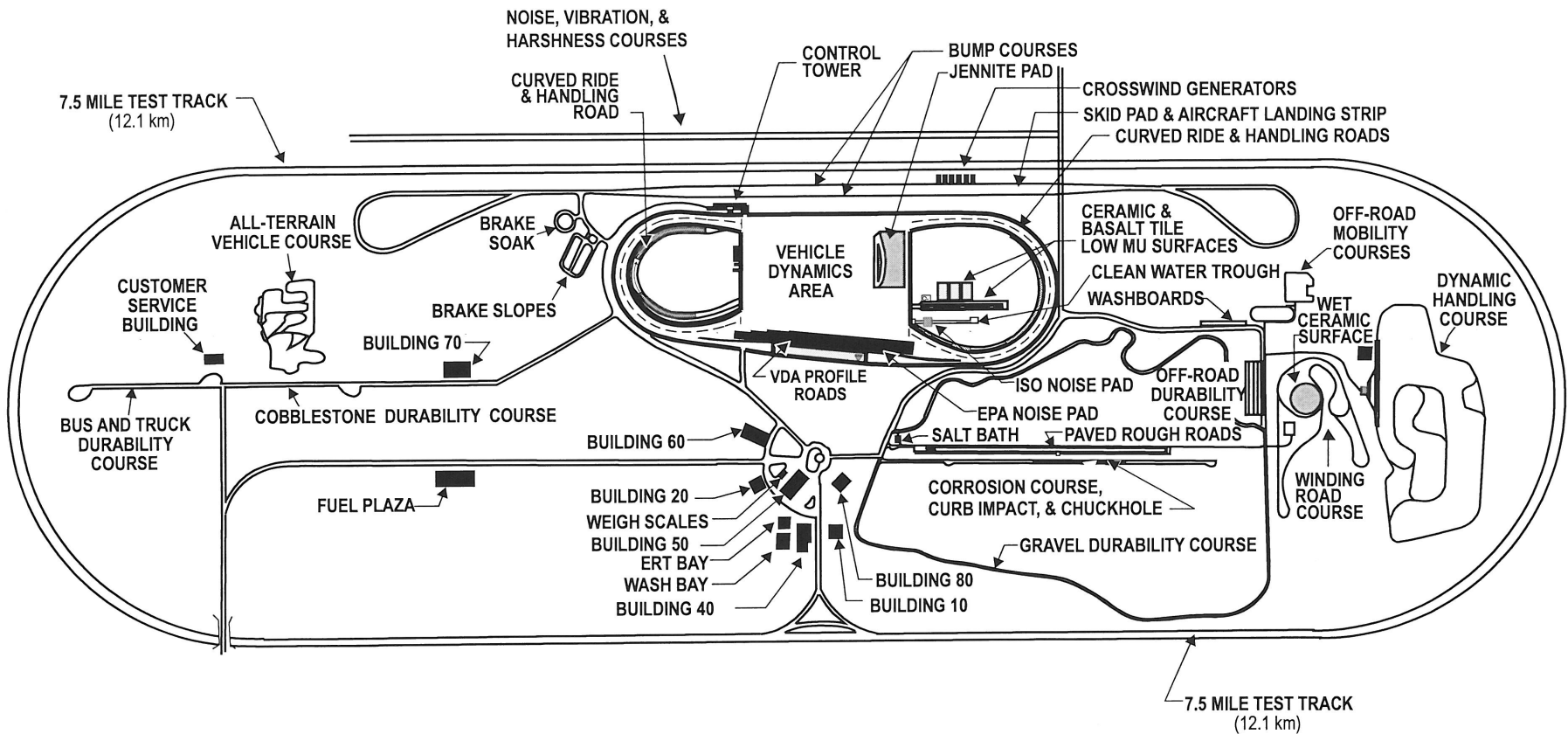
The overall dimensions of the pad are 9,000 feet by 84 feet with loops on the north and south ends. Both turnaround loops have a 309-foot radius and are 16 feet wide with a 25 percent super elevation. They will accommodate speeds of 45 mph with zero side force and 60 mph with .5 g's lateral acceleration. The acceleration/deceleration lanes at each end are 3,280 feet in length.

A test area of 210,000 square feet is situated in the center of the skid pad containing several test pads with varying surface textures. Skid numbers in this area range from 30 (wet) to 80 (dry).

The skid pad is paved with Portland cement. The load capacity of the skid pad is 36,000 pounds maximum single axle weight and 48,000 pounds maximum tandem axle weight.

Varying surface textures in the main test area are ideal for testing tire and/or brake system performance on different surfaces as characterized by "skid numbers." The skid pad is also used for acceleration studies, aerodynamics, rolling resistance, noise testing, and vehicle top speed determination.

The subject test vehicle was rear wheel anti lock equipped. Rather than rapidly and fully applying the service brake control, the driver modulated the service brake control as necessary to control/prevent front wheel lock.



Not to Scale

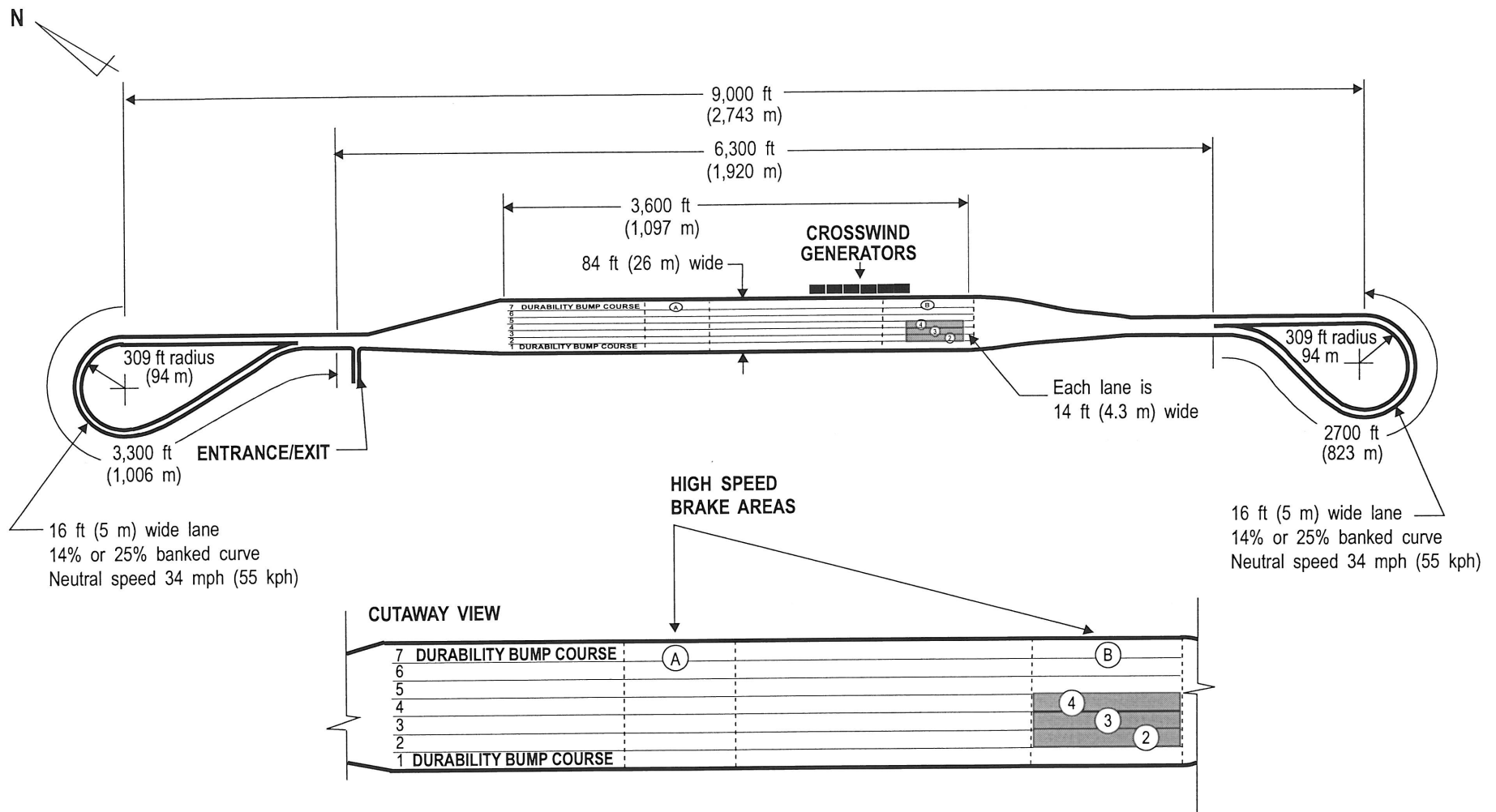
TEST FACILITY DETAIL



TRANSPORTATION RESEARCH CENTER INC.

EAST LIBERTY, OHIO 43319-0367
www.trcpg.com

F-15 0308



Not to Scale

GVW for Lane 1 and 7 (Asphalt Lanes) = 8,000 lbs (3,636 kgs)

GVW for All Other Lanes (Concrete Lanes) = 80,000 lbs (36,364 kgs)

All Concrete Broomed Surface

1 Lap (Including Loops) = Approximately 4 mi (6.4 klm)

SKID PAD

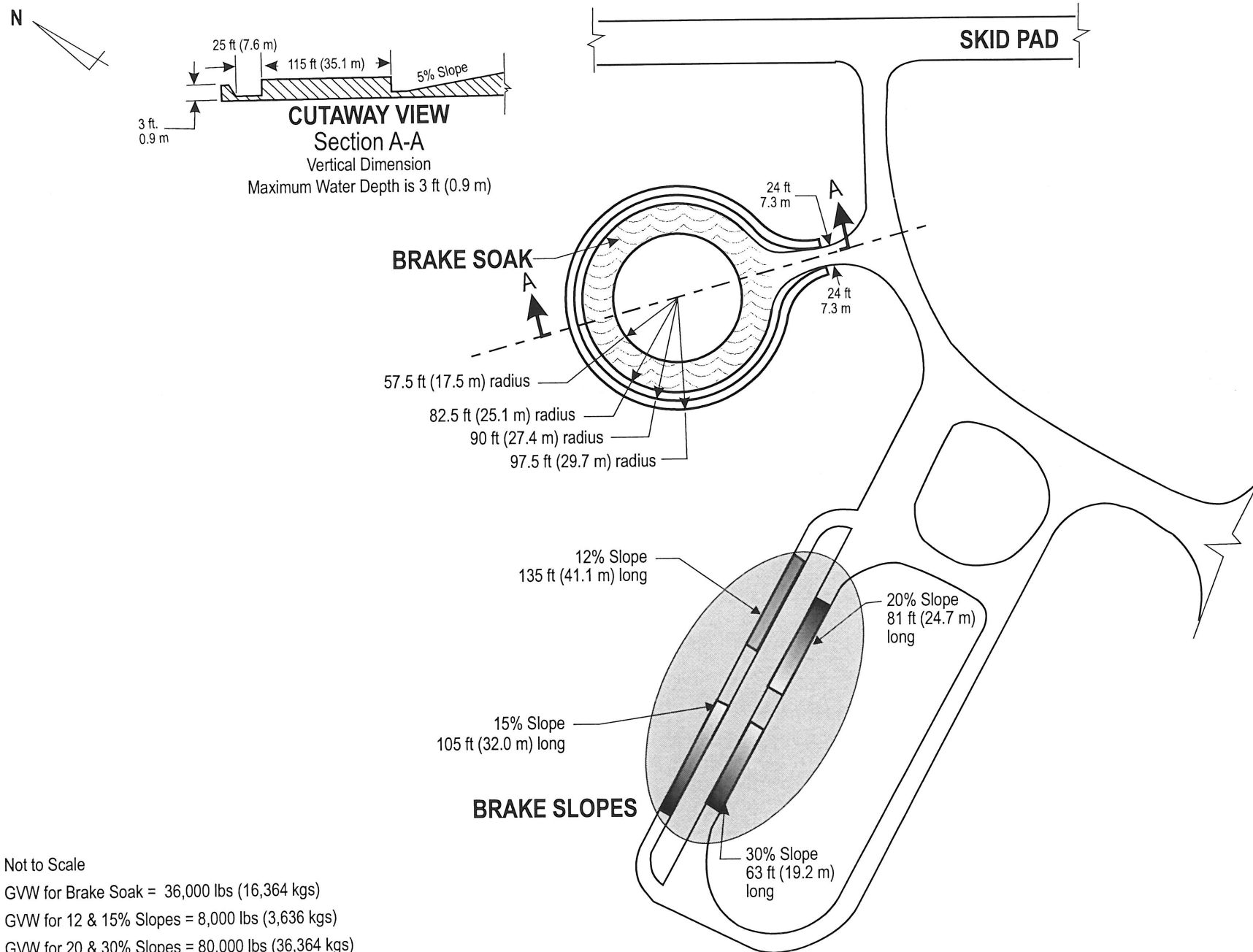
TRC®

TRANSPORTATION RESEARCH CENTER INC.

EAST LIBERTY, OHIO 43319-0367

www.trcpg.com

F-13 0308



BRAKE SOAK & BRAKE SLOPES

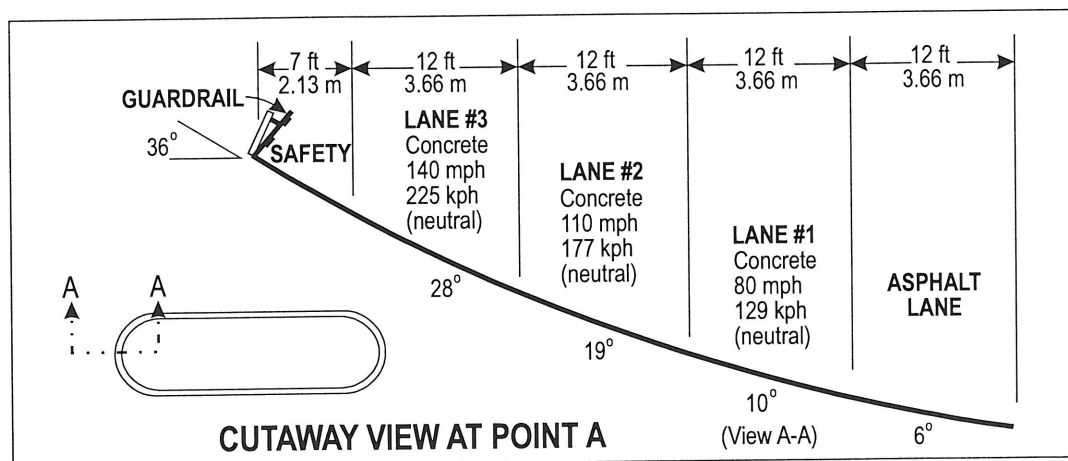
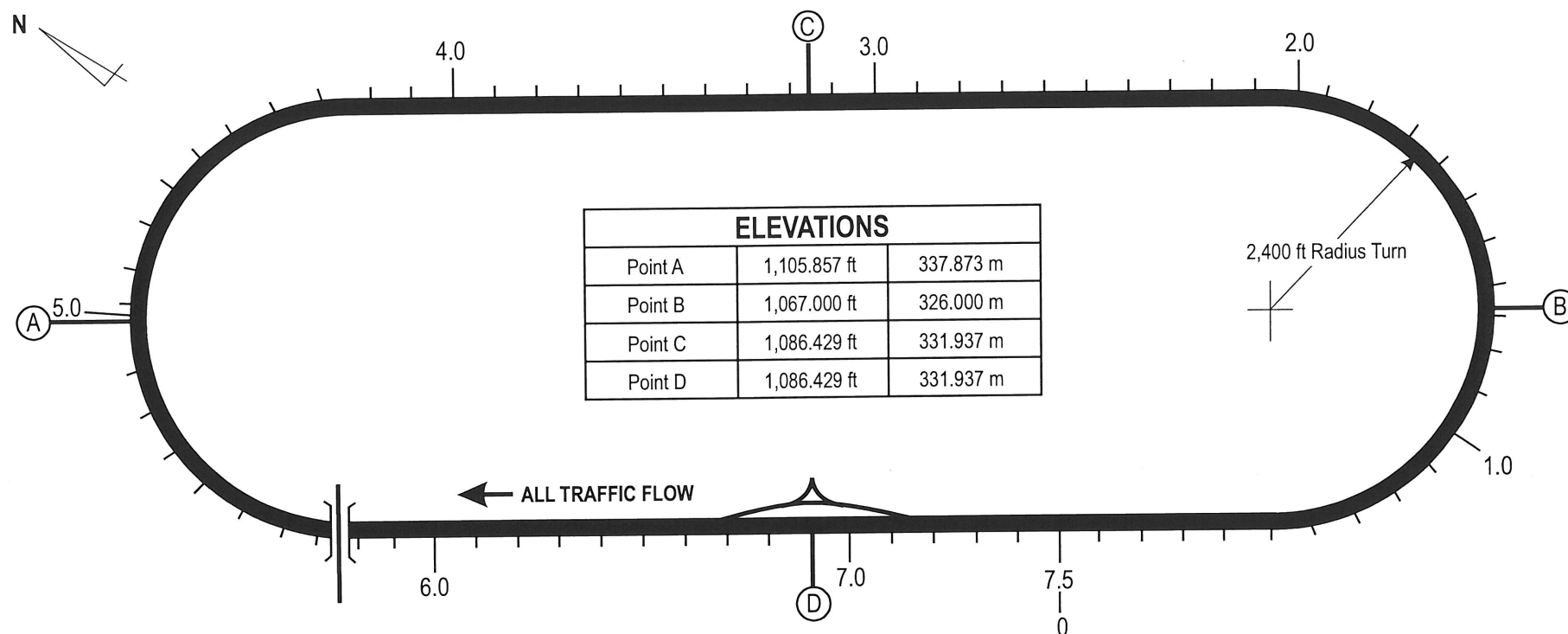


TRANSPORTATION RESEARCH CENTER INC.

EAST LIBERTY, OHIO 43319-0367

www.trcpg.com

F-3 0308



| DISTANCES | | |
|--------------------|----------|-----------|
| Lane 3 | 7.539 mi | 12.133 km |
| Lane 2 | 7.521 mi | 12.104 km |
| Lane 1 | 7.507 mi | 12.081 km |
| Point A to Point B | 3.333 mi | 5.364 km |
| Point C to Point D | .947 mi | 1.524 km |

Not to Scale

GVW for Asphalt Lanes = 8,000 lbs (3,636 kgs)

GVW for Concrete Lanes = 80,000 lbs (36,364 kgs)

7.5-MILE TEST TRACK



TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0367
www.trcpg.com F-10 0308

APPENDIX D

Notice of Possible Non-Compliance

This vehicle (C95108) met the requirements of the FM VSS 135 Standard.